

1. Pokuste se identifikovat rozdělení na listu Rozdělení.
2. Usoudíte-li, že je to možné, pokuste se transformovat vybraná rozdělení na normální a testovat normalitu.
3. Vygenerujte libovolným způsobem 100 hodnot s normálním rozdělením o průměru 5 a vložte je na listu.
4. Pracujte s tabulkami kritických hodnot na webu <http://cit.vfu.cz/statwelf/WELF/Teorie/tabulky>
5. Na listu Dvouvýběový t-test testujte normalitu rozdělení obou souborů za využití Kolmogorovova-Smirnova testu.
6. Na listu Dvouvýběový t-test testujte homoskedasticitu za použití Bartlettova, Levenova nebo Browna-Forsytheova testu.
7. Za jakých předpokladů lze použít dvojnásobný nepárový t-test pro hodnocení pokroku studentů?
8. Pokud jsou podmínky splněny, otestujte, zda se na hladině významnosti 5 % změnila úspěšnost studentů.
9. Na listu Párový t-test rozhodněte na hladině významnosti 5 % o účinnosti fyzických trestů pro žáky.
10. Jak velká změna prospěchu ospravedlňuje na této hladině významnosti použití fyzických trestů?
11. Kolik žáků by muselo být bito, aby byl test statisticky významný na stejné hladině pravděpodobnosti?
12. Na listu Wilcoxonův test pomoci Wilcoxonova testu zjistěte, zda jsou přístroje Digitel a PS-1 zastupitelné.

malitu jedním z dříve uvedených testů.

list 100 hodnot.

[y.htm](#)

mirnovova, Shapiro-Wilksova nebo χ^2 testu.

n-Forsytheova testu.

entů a pokud ano, určete, zda se zlepšila nebo zhoršila.

5. třídy na zlepšení jejich průměrného prospěchu

sti?

telné při měření koncentrace fluorenu v atmosféře.



Odhadované rozdělení

0.83724792	4.61609373
0.071849582	0.608915088
1.31989358	1.75820056
0.91985278	3.12215934
1.05892946	0.834213822
0.00178966	0.837800434
4.15915917	2.60094408
0.783542872	5.18533923
6.3284335	1.83451629
2.8073022	0.577465846
0.55203912	0.131489531
0.170394839	1.57231182
0.466027577	3.59915828
0.114185821	0.737232488
1.82758919	3.23633773
0.06192141	1.10017851
0.212036995	2.54890037
0.027526495	6.71745082
1.92801684	1.38264531
0.197521788	1.86910377
3.17377047	2.11712896
0.148811037	0.852968511
0.509351005	1.31825622
2.54132275	1.32066283
0.702876862	0.686375942
1.35738303	2.49307546
0.151739659	1.20225567
1.4738019	1.47478962
0.736150556	3.06457554
0.23096583	1.46358479
2.62476041	1.92808163
1.27594857	1.68589717
0.801732927	1.11047925
0.041726587	0.377271797
0.007679839	2.91477322
0.276265948	3.14393822
0.670956762	0.124067061
2.58507514	6.60228369
0.27611967	0.874037606
0.225459692	2.67779369
1.19013975	1.66673258
1.41750937	3.63083559
0.415386056	1.48066605
0.432010834	1.78854863
0.238463996	3.32665568

1.33154287	3.82992767
0.450007934	4.31767945
4.56566964	1.20549968
0.217266093	0.78527914
0.109468804	1.287577
2.50419308	2.14273821
2.10892388	1.07438398
0.146475326	2.80908187
2.09145502	2.19044442
1.0323149	0.770268925
1.20839546	1.02139249
0.640756396	0.297616571
2.99182239	2.50024209
0.342962777	2.08730876
0.348470398	6.04415206
0.717577255	1.81276428
4.12650122	0.275175607
0.286196837	1.51638096
0.578617728	0.84460481
0.239297224	0.319951028
0.282632072	1.26838315
0.336426601	2.01030092
0.047664427	0.609423593
0.306363653	0.480824807
3.36644643	7.53220842
1.12452852	1.04666112
1.89948372	0.840595134
0.807869479	1.18509793
0.579195923	3.74700644
1.94706915	0.04379697
0.318372743	0.575456954
0.14565372	0.881446614
0.073001802	3.51613664
3.642943	0.225511139
0.955024108	3.54284737
1.17439596	5.11648831
0.35404116	4.77127546
0.127717127	0.542940024
0.559676019	0.841594524
0.013213168	2.13143463
0.845784354	3.04816108
1.58616483	2.21548555
2.92493756	0.629703484
0.8879428	0.807477963
0.676715844	1.08919394
0.457851317	2.09421839
0.17733821	3.42135302
0.083952699	0.780820453
0.599107278	1.82457624
0.120531698	3.41610141

1.19676861	2.29244799
0.211791829	0.480155166
0.781846907	3.46911179
0.698858526	1.90171556
0.582511968	0.854716378
2.10778968	0.510274004
0.562664932	0.916306151
1.09936564	5.3219318
1.11520793	1.27234088
3.03945892	1.73072669
0.08684067	1.81653558
1.02121237	1.81428574
2.77746448	1.07878033
0.632487322	2.75477741
1.55247216	1.05716119
2.04898924	2.15940081
0.293944535	0.899142593
0.093653326	1.02888509
0.650956845	2.2555387
0.170131238	0.697397768
0.213744027	0.737077266
0.609283112	1.82877206
2.95394702	4.93463168
1.11271409	1.4241893
0.097610514	1.62858508
1.77790948	2.31114064
2.18945501	1.68989423
1.45191538	1.57714892
3.02504863	0.580265563
0.456428607	1.18611034
0.030115943	1.94990828
1.60698929	1.32987656
0.741315391	0.729600934
1.7750115	1.47247923
0.565989237	2.68195831
0.009658118	1.579176
0.858337562	1.27635909
3.41357508	3.67613896
0.266017496	1.93869757
0.445298201	0.460368279
1.27101806	5.15349806
0.449136228	3.81757384
2.44974553	0.528987738
0.332138975	3.86367505
1.7677909	0.706844576
0.633840103	2.73653881
0.61513267	1.05011975
0.364933827	0.838756134
0.311998794	0.800066359
1.33364097	1.6310202

0.146285194	0.698319612
0.559904481	0.161527938
0.734658215	3.21770993
0.053866186	0.6397556
1.66389728	2.14519842
2.72111221	1.08918206
1.92483172	1.33302262
0.023677949	0.685832303
1.40512725	1.07883025
1.06770377	1.85896045
0.155585431	4.52264183
0.508953107	0.586302277
0.822403634	0.9754086
2.8561089	1.11671893
2.23941914	1.40054741
1.96585367	1.02258165
0.338007904	4.26992807
1.3373911	2.75602117
0.032310725	0.347577689
4.91217069	3.13470814
0.048248182	0.635637236
0.112833071	1.5800683
0.17178676	3.40667741
0.543991994	4.65091707
1.11590067	1.46727351
0.611388324	3.84291768
0.470036269	1.54666776
0.627598202	0.616333586
0.520575581	1.22498683
2.56797765	1.79774217
0.600447856	3.64886864
0.445281438	0.140255427
0.168212555	1.12642104
0.333530399	0.485142655
1.3727197	3.67436274
1.51145509	0.875068062
0.161413737	3.10758573
1.20233229	0.766898408
0.226402946	2.99758114
2.64051996	1.57676057
1.28942431	1.41186142
0.742786886	1.63427787
0.184042864	1.55496852
1.09659705	2.56625876
0.409266674	0.729731357
0.013065471	0.402141192
1.30551638	1.8084492
0.136733356	2.31240748
0.289865101	1.35558121
0.193708209	1.57229014

1.24835625	2.53796924
0.203052413	0.830368488
1.79782033	1.59898138
0.345364928	3.4256358
1.52964334	2.97248557
1.47683769	1.52312287
1.13784654	1.10291339
1.01950384	1.02651991
0.224514608	2.18014946
0.404596521	0.80211554
0.145139149	1.18704592
4.90851049	2.04635116
1.38190968	3.96295443
1.62912671	1.5009308
0.088679532	0.534538257
0.230320969	0.893203077
0.498539972	3.02459871
0.196564319	1.164215
0.79396926	5.20428714
1.04947231	1.30259457
3.9482628	1.47220244
0.039829021	2.69434271
1.34529653	0.381240399
3.57263883	1.63498912
1.71071814	2.43012848
0.687191998	3.08107946
0.873303111	5.53732058
0.024609006	0.452874245
0.045423089	1.01064051
0.249551742	1.07511623
1.70745873	2.34719769
0.054801759	3.84253033
2.9042465	1.15508069
0.249344969	1.83182625
0.668053952	1.45329434
0.8368811	0.193992483
1.51629773	1.75974909
0.773130256	2.46870143
0.826950836	1.66837038
0.727730596	2.37913743
3.16572082	3.47822979
0.275805202	2.57631883
0.374995802	0.408381773
0.009302996	0.318578933
2.23732961	1.46805554
1.57526347	0.550416022
2.19090234	0.843313102
1.27524489	0.99624538
0.643176391	2.3333392
1.89824124	0.88006267

0.011105933	0.73733326
1.15276476	0.205982761
3.22591595	3.65914468
0.207569276	1.05183983
1.41447676	2.6144833
0.079445128	0.441257126
2.44489804	0.734865848
1.49361308	1.46594429
0.783563274	0.460325747
0.880387966	1.43516709
3.01867688	2.57914603
0.26580334	4.55569642
0.829493145	0.169658541
0.490134131	0.380581291
0.158977665	0.59805578
1.84388942	2.6291924
0.685018828	2.33515779
0.032380635	0.726233222
0.847714473	3.15801191
0.000573512	1.82135723
0.687063678	0.910507562
0.8934284	4.62896254
0.128870501	5.81189295
2.19384794	0.666334655
0.317144286	4.96922922
0.261517215	0.836704667
0.019029365	0.404215646
0.80409849	1.67371118
1.56525952	1.80972835
0.244849615	8.10498865
0.672673749	0.7887496
1.71287759	1.43814229
0.028964751	1.82076673
2.83909031	4.9234326
0.255605361	0.880131246
0.758893634	3.28148862
0.325463881	2.53273888
1.28329642	1.69578315
0.56659409	3.262265
3.4269338	1.66115834
0.140886086	5.47318827
0.977404368	4.99285271
0.323794545	2.23263605
0.23859043	1.78305981
0.63223575	5.42148511
0.867940213	1.08406635
0.920716861	0.947725553
2.94481578	0.93033719
0.729449691	2.95696917
0.393675152	0.579394132

2.09288739	2.01711765
0.99852236	1.30762502
1.47137153	1.16585892
0.902713106	1.51009003
1.1090153	1.59656778
4.88765208	1.41270028
0.827382564	5.68017942
0.695115657	4.78979001
2.03849707	3.04570821
1.32571698	3.74982103
0.465255583	4.12924851
2.28302126	1.41094861
2.12510343	1.94207923
0.903028098	3.55115513
0.04886062	1.68040374
0.232577979	0.527527871
0.36161954	0.608644192
0.567530997	0.384583956
1.11696009	2.68990994
0.215633165	0.894841157
0.226107136	5.76236686
0.598329306	1.13724486
0.655443646	0.723426239
0.833695677	1.43804639
1.83117767	0.540239499
0.34289817	1.40665441
0.357370194	1.94552655
0.182405258	4.07882067
0.276832459	6.37464507
3.08671511	4.86954427
2.19383125	1.22429525
5.34372722	1.51544363
0.393439746	1.06273556
0.151815827	2.76307722
0.598542871	3.45897103
2.91110108	1.85960455
0.057293498	2.36049981
1.06057503	0.954097647
0.581052448	1.480355
0.068189773	1.41983649
1.5433126	0.69225711
0.030987072	2.85666321
1.52070693	0.378987055
0.445122194	0.354495651
1.18780528	0.443454339
2.33882997	1.09548781
0.097480042	2.20451104
0.199746974	2.96442973
0.094458261	0.113631183
1.82182871	1.49956847

2.67682446	4.51228034
1.31647085	2.26299038
0.336056037	0.629475667
1.7919137	0.591623487
0.728997819	0.341249168
0.560779675	0.834320034
2.42581677	3.15780298
1.5929145	0.066434557
1.1239316	1.22221038
1.4519008	3.13989153
0.900011769	0.516578166
2.27883846	2.132955
0.347381738	1.80351103
0.837708277	0.590662649
0.086136751	2.43153447
0.821808633	2.980761
0.817276951	0.349982707
2.14733938	3.11653008
1.29867701	4.26262437
0.25921516	0.342879996
0.821871828	1.10544478
0.24447225	1.91904099
1.17119093	1.01659326
1.42728946	1.14001941
0.642161839	4.18206197
1.48342539	2.59932973
0.827675573	2.65472627
0.113576956	2.59210335
0.428889658	2.75435967
1.55245741	0.812188909
0.241989344	0.640242973
0.163853254	1.96651415
2.75886345	1.73463365
2.0882464	1.87837154
1.66511257	1.77556531
0.829122124	3.08288005
0.491044236	2.37750213
1.1481339	1.60208814
0.114486069	1.85282759
0.111604515	1.82485939
0.043455544	0.840734134
2.77220905	1.9881803
1.25120405	2.11039418
0.291202582	3.0780831
0.9504579	4.72365834
0.900462062	0.327756453
0.014012899	1.60248314
0.146825374	1.10016087
0.075054424	1.22918908
0.376368493	0.820776218

1.75116203	2.06113641
2.21362484	3.78826516
3.32696407	1.99623137
0.16122473	2.12748454
0.254169052	1.29441426
0.115732079	1.50694729
2.6490067	0.472640381
0.008627269	3.28476857
3.84387175	0.196646401
0.437114896	7.15535892
2.35412221	4.33445306
1.25565571	0.722553626
2.73881236	1.39014333
0.701315675	0.898731607
1.82729147	1.00950886
1.86676978	1.6706288
1.50907065	1.28158632
2.64601556	1.40894639
0.710458773	0.796396712
0.970545316	1.05022398
0.872928448	2.66010697
4.00212312	0.821333127
1.17367914	2.08599208
0.125204355	1.05698032
0.286890002	1.9253107
0.616386979	1.32684756
0.942340492	0.871378871
2.12689892	0.844299018
0.765041087	2.49765744
0.225237123	0.446244761
1.68098298	2.3100758
1.13394234	2.34017885
1.20479991	1.48494512
1.38945768	2.26006783
0.018111029	3.19297985
0.594952906	3.10247837
0.943626822	1.1456328
0.042616986	1.91300355
1.05834121	0.569952356
0.75511437	1.47917392
0.085590375	2.5568409
1.49792085	0.316371298
0.226123455	0.964545518
2.09797777	4.27875226
0.206018545	0.886727611
0.557720019	2.86630352
0.674619787	1.28427357
0.254875731	1.92050222
0.781810845	1.09685887
0.787420337	2.56024572

0.587207436	3.30026843
0.184186075	3.37438681
1.60970354	0.793800293
0.670138319	1.84912423
1.02343603	0.572026677
3.4415223	0.930064736
0.426516194	0.638736158
1.98356716	1.17819658
1.21341771	0.970248554
0.068149539	0.223322084
0.619032566	4.34064452
0.461436382	2.46772
0.937671978	1.93984376
0.301089901	1.49721342
0.034601074	1.27342684
1.10945092	4.13866329
4.5627402	2.87332388
0.871374625	2.93299776
0.483487226	0.767181957
0.655687176	3.0045467
1.30195949	0.455157779
2.97549219	6.03252462
0.002702231	3.06463273
0.996741885	0.525557239
0.306233822	2.51163241
0.05542934	1.9886226
0.925079887	1.34889746
0.587783604	0.568419525
0.209035143	2.54997788
1.38812498	4.74103051
1.65554793	1.4551925
1.61783268	3.26804771
0.313409448	0.411195489
0.41197711	2.49219056
0.360838008	2.36601967
0.569799886	0.991450101
0.757131167	3.13884519
0.537403577	0.610727122
1.25872712	0.605510232
0.125805764	0.776591504
1.01015454	0.181142373
1.64238161	1.92357469
2.47991047	3.33157338
0.696533408	1.36571292
1.48553765	1.67964589
0.299036314	0.489231875
0.362041019	4.50613721
3.38373654	1.28208846
0.40326604	2.78006595
0.170220786	0.352288935

1.89057914	2.39040799
0.778678744	1.45521521
0.952152519	0.573367229
1.0868349	0.172199591
2.51825047	1.66700694
1.31287518	1.36749775
1.45843425	4.15009666
0.196303867	1.78150094
1.51714613	2.8725123
1.57393266	3.00846641
1.09244611	2.56041277
1.00655363	0.713994133
0.898018511	2.32335174
0.684328674	1.21720102
1.66041377	1.55932366
0.043833393	3.69953505
0.831486111	4.95652461
0.443091749	0.738782067
1.60057362	1.67513123
0.921485774	5.48436495
0.515960502	0.970219542
0.228361815	2.22227022
1.41137478	1.47405587
0.09709327	4.09431625
1.40555068	0.725521362
1.1039705	3.24156467
0.672236001	1.60276798
1.92363646	0.937415558
0.136761506	0.234772361
1.10122968	0.185474388
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1.2381821	1.26300237	4.65498669	0.889635497	0
7.84160511	0.535398288	5.5525804	0.995908441	0
5.17471471	0.300064326	7.17921745	3.35410491	0
0.117250641	0.711834236	2.38528129	3.9802728	0
1.18802244	1.04811929	3.44519113	2.24900425	2
9.32234298	0.905217468	3.6756243	5.60156967	0
2.88576387	0.928882341	2.13438479	4.88548778	0
9.40664098	0.489609753	3.63778477	5.76389176	2
2.23420467	0.901182898	2.34732834	4.8365108	1
9.59688556	0.85923329	5.54529954	6.31341028	3
8.55456247	1.71826586	4.44208832	3.03699163	0
5.68246523	0.189329697	6.63473311	5.57978692	1
3.38114065	0.473666435	5.36108282	3.45555332	0
4.15980907	0.337055819	2.81499049	5.42687997	0
8.93378986	0.274977168	3.6758382	4.74796921	0
2.2308222	1.52090035	2.62617724	3.21235179	0
8.19469695	0.479263382	3.11744143	4.5084163	3
7.88809959	0.917116676	4.79370716	5.08413653	1
6.08197488	0.646731118	3.07617685	2.82284327	0
0.485396609	0.467104965	4.56464458	5.5110548	0
4.31906746	2.30790301	5.24608146	4.71251113	3
0.822722241	0.66028428	4.56962693	3.36710802	0
7.68842133	0.339281322	2.78195084	2.12137971	0
8.58136965	1.03682942	7.07053321	5.8423055	0
5.77471828	1.03788534	5.50474685	4.87629835	0
7.15872766	0.364250084	8.14049645	5.89211735	2
8.89257425	0.456584505	6.46335318	4.7964227	0
5.10879893	0.665985268	5.10687745	2.20935075	0
9.95424798	1.22459269	3.19687647	5.26830281	0
1.23085368	0.58837527	2.57816325	4.77306746	0
6.37067682	1.29847537	2.49566119	3.74548744	0
4.39208425	0.47166812	2.90357186	6.63560448	0
3.59796184	0.385652252	9.21144283	3.89085995	1
4.85046573	0.717846347	5.25432553	2.91386657	2
0.147984561	1.78545494	5.24961241	1.05198782	0
2.83696791	1.83464432	4.51906927	3.26185436	2
0.358787184	0.927375513	6.15349922	5.22454327	1
8.96248137	0.897847465	5.11239232	3.53347272	0
6.91195694	1.25541672	3.90808275	4.8373349	0
9.94677059	1.89777199	6.60505704	2.92526934	0
2.38304025	0.868626346	5.0580403	3.68076298	4
3.91330234	0.609757408	2.86760685	6.32544967	1
3.75862162	0.682942547	2.41347406	3.19725535	0
3.16243757	0.143767027	1.86023221	5.38095709	0
0.443153	0.888342678	10.3867769	0.281903208	0
2.48894887	1.23441214	4.19860861	3.83903734	0

2.30249165	1.07224566	5.60452417	4.34454117	2
4.75924115	0.618430211	3.86354048	1.77642847	0
7.03886696	1.23451929	1.59179378	5.27424246	0
3.41347401	0.832096284	8.54168176	3.68517517	0
7.76185633	0.264851726	3.41338698	2.81501822	2
8.57174605	1.15561954	3.84413902	1.80679292	0
5.78767429	0.43106686	4.4904394	5.92414514	0
4.70571977	1.04404331	13.9662853	4.46623178	0
5.37493672	1.31649142	3.02763993	2.64099995	1
3.84093399	0.590133727	6.06831942	4.9135266	2
5.18499843	0.705796681	5.21494599	2.47513561	1
8.0717028	1.82638737	4.63566885	1.77112182	2
8.10219464	1.42621738	9.59324849	6.08913908	1
7.6336743	1.46931204	3.36665039	4.61699724	3
7.50802205	0.799734401	2.76841507	2.83716045	5
0.343087723	0.636491514	6.10398453	2.04294708	0
3.82128033	1.36238289	4.5567332	3.98173797	0
9.44860579	0.79813452	2.42237175	1.97060943	6
9.2030612	1.12713536	1.82205193	2.18940978	1
7.84729125	1.56586872	11.7381841	5.24888862	1
2.56385624	0.711362595	5.12898424	4.06702564	0
3.21349402	1.24373304	3.57023764	2.41931867	0
0.062893326	0.674180827	4.8426281	6.94635519	0
1.25139523	0.313809272	3.88379612	5.15682522	2
0.934685143	0.087888065	4.13567917	3.47102305	0
2.39465273	1.29075349	1.5681156	5.19881714	0
7.58704994	0.982784813	3.85412206	0.089630905	0
1.7419679	1.16559564	4.3447838	6.73728999	6
3.79437587	0.497938034	8.18298275	4.03682226	1
7.79922123	0.371010399	2.69735477	6.80357358	0
3.23048891	0.260513008	3.39725848	2.94831539	0
9.64490192	1.03492747	3.55540795	5.59217506	1
6.1249164	0.900155005	2.81650256	3.04979461	0
4.8136523	1.1406648	2.82984975	3.58324928	1
1.20306368	1.80986399	5.50812256	4.86202933	0
7.97521417	0.733488908	5.30464056	4.74582711	0
8.79579717	0.320184089	3.15528244	3.50410233	1
5.512226	1.78961749	3.99767309	3.21063219	9
0.397965952	0.304849406	3.29479019	3.34099728	0
9.38664563	0.522207969	5.23971423	4.2448349	0
2.37793817	0.137245506	5.11431821	5.64397049	0
5.10134953	0.644014729	3.63401554	8.17664387	1
7.75081676	0.346265232	3.40555852	3.25524538	0
8.57625868	1.79549926	2.76962873	2.37003907	0
5.78417652	0.994613001	2.33241162	2.93483088	0
7.27119649	1.68442753	4.08432367	5.58447681	0
9.59600096	1.13470183	4.22036014	8.02214655	0
1.20876992	0.137810652	3.61158715	4.70652608	0
1.26127897	0.566226436	3.04067677	6.0789061	1
2.30300493	0.696055683	6.36145824	3.53500266	0

8.06050293	0.77313056	4.82485184	5.88649262	3
3.33852184	0.467908965	2.47015946	2.26670618	0
0.8046489	0.689392831	1.42861737	2.66244057	1
9.53609159	1.36413551	6.0641076	5.19315087	0
8.06439391	1.07460841	4.00949282	2.56650703	0
0.614138113	0.941620464	1.74347465	2.73137086	0
6.15975316	1.14648381	7.10863011	2.59533872	1
1.74530328	0.595883696	3.6392017	3.90581542	0
7.22121317	0.883192178	3.92841511	4.6838245	2
3.52457529	0.642591074	3.1531126	4.60319371	0
0.727748806	0.807164818	2.4170384	4.97361851	0
0.026850272	1.5790939	1.72232485	2.19369984	1
2.12587269	0.938319024	7.13693553	3.21320472	0
4.26859563	1.20226999	4.40159042	2.00030052	2
4.5335137	0.387353736	3.25400494	2.33760923	2
8.18188939	0.703358499	5.55849655	4.01927811	1
8.13596071	1.68107982	7.47815819	2.19531394	1
2.28238381	1.17167055	3.35864274	3.2002815	1
3.64965256	0.476632761	6.90642763	4.82377863	0
5.12799182	0.804169906	3.82214611	4.42275999	0
2.55383948	1.12970697	3.07782942	5.43802096	1
7.25138754	1.54134803	4.25437992	3.74203765	3
0.099146343	0.329714821	2.86869314	2.73871307	6
3.37811336	0.951430156	2.83957613	2.43226011	0
3.94686521	0.800201911	2.72031082	5.45824058	0
7.74907571	0.49443086	2.58896925	6.33894019	3
1.23399625	0.484370178	4.01874371	4.97884986	3
5.64353353	0.928028489	4.51853615	5.82135852	3
8.3390306	0.846911683	4.47784633	1.97091469	0
5.99989871	0.534077718	3.42286963	3.54193956	0
6.71307037	0.059805356	3.0402727	4.69241468	0
4.51153573	1.43312352	2.40847208	4.74667602	1
3.12624756	0.372777975	4.51342614	4.69158019	5
2.045848	0.918048566	3.79265216	3.31663442	0
8.48931337	0.326270424	6.67595719	3.44743167	0
2.83018521	1.28151402	2.7759964	3.35198765	2
9.45828076	0.566714814	5.04909337	3.75971283	2
0.145873362	0.832553466	3.92029174	1.41167496	0
9.76473739	1.15479489	6.45221026	3.84595186	2
3.52909578	1.46866631	5.27603303	3.27183298	0
9.80671229	1.0550147	5.72767205	0.459395811	0
4.44506645	0.365245397	1.65881854	3.3999277	1
8.52804834	1.86661856	1.82443626	1.87183923	0
9.78165564	0.680028937	2.92541907	4.2008136	0
8.19160177	1.12161018	5.5701484	5.25217123	1
1.73415649	0.20635719	4.35710126	2.57658642	0
9.79480644	0.715013958	6.17741551	4.83953113	0
0.891200381	0.117021764	2.57173834	2.28498453	0
1.49990042	1.05806684	7.24711264	2.55187352	1
2.77013148	1.11071272	5.3939091	2.82256183	0

7.3673051	1.04290349	4.38508113	4.57535977	1
6.87612561	0.855842258	2.95356963	1.5622656	0
2.22351599	0.68039579	2.93505284	2.71967672	7
1.74791667	0.818820735	2.53752471	4.07313596	4
1.18698431	0.676219909	4.35174319	2.92370434	2
8.83290024	1.33915477	4.16715061	3.95762696	0
0.531496529	1.63250106	3.1714592	5.3298694	0
5.27150791	0.955837121	7.2682555	4.22539782	0
2.38945137	0.419857416	7.49608761	2.28313985	2
7.22939111	0.656176221	4.75883818	5.83041398	0
0.456962022	2.10106189	2.72160133	4.76196262	1
9.92409637	2.40010253	5.4686768	4.46325155	2
1.51925844	1.7517155	6.79317158	5.53743612	0
2.3015251	1.30568269	3.55473783	4.97625889	1
1.01153403	1.50834395	2.63127623	1.69852307	0
5.32617691	0.708691655	4.83662712	5.76112439	0
2.01906084	0.199495197	4.36804469	2.71781463	1
8.29758042	0.679102842	3.06033499	3.49153719	2
8.23274616	0.018969222	8.28918061	4.01272231	0
1.97416398	0.561515822	6.78094545	3.36866098	0
7.66182806	0.250195073	6.66247628	4.0834448	2
2.48022598	0.926760042	6.77260362	4.7059469	0
5.56241718	1.17048733	6.27577836	5.19022109	0
2.45048682	0.462454675	1.78687161	4.70129883	0
2.59845339	0.771463086	6.84599961	4.66836681	0
2.63762054	1.0839331	4.31049736	4.65288422	1
9.64562058	1.56462442	5.52955534	3.81485296	0
2.94316105	1.46209038	4.56438769	5.46417649	0
2.83408625	0.47533881	4.60481239	3.52107319	0
4.98387072	1.4284691	4.14112248	5.09695022	0
6.10495741	0.712581348	2.51675439	4.84435197	0
6.34471197	0.237241173	5.78229068	4.56103123	1
7.10585215	0.361182218	4.78450092	6.19551387	0
0.798049062	0.562994216	2.89889662	1.27111178	4
3.13221713	1.48069396	4.15023001	4.37278842	0
7.75228701	1.36100858	6.20885066	4.66329405	1
7.97337778	0.872561619	2.47285631	3.8625086	1
1.57162134	0.233137424	2.81674987	4.32356926	3
2.41808314	0.811426182	4.3847308	5.77879508	0
4.01594629	0.058707885	3.63580065	2.66217132	1
7.58864587	0.861541283	5.72824775	3.82903869	1
1.50993072	0.226666231	6.1615515	5.3190033	0
3.34974137	1.02030786	2.73947008	2.70949781	2
4.22233273	0.832750363	4.17617678	4.36675267	0
5.82345898	0.832343852	6.16938687	4.38998331	0
7.83933885	0.346926526	3.86596489	4.19323886	1
8.24002096	2.19857811	4.33890028	3.68424664	0
3.04261067	1.3797315	4.03460644	5.23136354	0
9.01435694	0.308970291	2.39678264	3.1869058	0
4.72534105	0.476775515	3.78355933	3.38217057	0

2.09949089	0.54013876	4.93932874	3.56923854	2
8.12224797	0.653374443	3.96937504	6.10319972	0
3.61953332	0.342231517	3.81095505	0.041400338	0
2.9973671	0.914892074	7.98334598	3.90452743	2
6.01529209	0.752517142	7.33590519	3.34704847	2
1.10300439	0.680668829	5.00891447	6.60411926	0
9.45683106	0.483657089	2.94244126	5.12530662	0
5.31995106	0.068521317	5.02599161	4.84209467	0
1.14322946	0.835530369	7.45847182	2.87702468	2
6.41563152	0.205828099	6.52879281	2.76579103	0
0.381664201	0.506984786	3.97080339	4.13059587	1
5.46249724	0.655784556	3.26821703	4.01287051	0
0.667202778	1.29403752	6.41334792	3.49419247	0
4.90687979	0.698025056	3.50713053	4.39723953	3
9.07710158	1.12741021	3.65172275	5.27425233	0
6.11592535	0.915297581	5.82780224	1.45355428	0
8.83686279	0.716924803	6.76814631	1.9449774	1
0.966752276	0.209651809	2.29772225	5.87816598	2
8.06486141	0.811431896	6.12899962	7.26844626	0
3.66584327	0.608652374	5.42876745	3.14920972	0
1.08299004	0.967647061	3.81418599	3.82910294	0
8.82771506	0.468395926	7.80472013	4.19537892	1
2.99107197	0.809196229	4.62570815	6.03203878	0
3.47927011	0.992815577	8.0258252	5.51444966	0
3.78726248	0.350279078	8.98268663	2.97772696	4
5.91332298	0.515970122	4.33864889	4.19135562	0
4.08440938	0.821914059	2.82812077	1.89145641	2
3.0181873	0.595796464	3.30862795	4.8549786	0
0.269195603	0.964530609	2.48027066	4.57797164	2
0.857034659	0.752838738	5.14869969	3.50887345	0
6.67874912	0.517970581	3.53860953	5.06357346	2
8.43235811	0.429938304	5.89871517	3.6125616	6
7.4394161	2.10113617	7.61295623	6.23065627	0
8.67655132	0.604848049	9.07593891	2.96453781	0
5.94895915	0.240420116	3.11000441	1.45700114	1
9.74668043	1.03795909	4.38025999	4.33861034	4
5.85816546	0.756347504	1.89282063	5.09898046	2
6.96168873	0.769477393	8.3406953	2.3910961	0
2.83004186	0.790936473	5.5914243	4.05051856	1
2.70334886	0.485425149	3.15264345	3.91416704	0
8.59178126	0.922922163	3.95290553	2.37218103	0
3.90411536	0.948060051	4.44719095	2.77225073	0
8.88588739	1.05726278	8.81710379	4.14759254	0
4.09502846	0.54770125	3.11506604	4.24756185	1
6.31058545	2.13029517	3.64273467	4.11339782	0
7.29423926	0.454560656	4.80012461	2.42897901	3
4.26350942	0.119186777	5.6018143	4.38258464	3
2.42274405	1.82932715	2.40737325	5.63030355	0
8.81374883	0.985448527	2.61895644	4.92933419	1
2.65804203	1.21039429	2.57377835	3.69453235	0

1.2922093	0.929799487	3.05236288	3.10431218	3
7.29932686	0.386200915	2.789381	4.55219417	0
0.612645138	1.15318977	2.55109063	4.54383396	2
5.74862851	0.463842661	2.10377463	3.3535283	1
0.26471151	0.525732568	3.88980109	1.60486375	2
4.90238447	1.17762946	3.45990253	3.50044229	0
3.19832406	1.09062371	3.56646252	6.02584257	2
6.03286149	0.680175406	2.93083024	2.42788894	2
1.12215238	0.325694462	2.76104818	4.690751	3
1.63191014	1.34482303	1.64111025	4.05366092	2
2.08105791	0.661204939	2.782306	3.80332834	0
0.37160205	1.62978264	1.95514283	2.14110865	0
5.93609236	0.92849165	4.52717241	3.82551408	0
9.94640881	0.220767671	3.7781195	2.13240575	1
2.88324548	0.757256804	3.38833547	5.2874541	0
8.92270775	0.609313332	2.3359868	1.99033254	1
4.76542117	0.832466138	6.09856024	6.21423751	0
4.97075874	0.187951394	5.90016006	4.50465673	1
0.259428495	0.64655736	3.32096026	5.30206758	0
0.695380776	0.871442226	3.76245519	3.86592093	0
6.91909852	0.999585407	6.86763143	5.11900048	0
7.57657132	2.03594582	2.07477479	6.87734379	1
1.36921922	0.793054989	5.40186163	4.64032444	0
1.57647001	1.28194257	5.07066844	3.08872027	0
8.53004722	0.621743399	8.41273648	4.20004484	0
0.195574735	0.532527353	8.17828667	2.55444386	0
6.43706208	1.37046028	7.96263951	5.01548206	0
3.7454401	0.716835263	4.69207269	2.1282168	0
8.86059673	0.562913621	1.921211	3.88366192	1
9.88256673	1.19159213	1.56332115	5.40032116	0
2.13295109	0.422410088	6.42388836	2.60733281	0
2.86685525	0.825514819	5.73044941	3.24202163	1
5.62083558	0.439396966	3.08094854	4.39208486	0
9.00467582	0.597980719	4.27473144	7.52113774	0
4.53323814	0.124858495	5.60622973	5.54215399	0
4.78960836	0.167614788	5.46794557	3.9407145	2
5.26624884	1.00804145	5.90331246	1.71614231	1
3.34577796	0.613982035	3.19114433	3.11294051	1
9.25838333	0.749023078	2.91002778	4.32516129	1
4.94055104	0.942819788	3.82705632	3.00743592	1
0.236909648	0.60204622	6.60131256	0.975449078	2
4.952961	0.969560781	3.15880247	4.33152942	1
0.331957468	0.3837431	4.39666106	3.10484004	2
8.75062175	0.803400777	2.90384709	1.40256703	3
2.4578917	1.01396054	6.53376107	5.72434783	0
3.68458385	0.443797502	3.15441092	6.40960504	3
4.93641265	1.44293851	5.48620881	6.1898459	0
0.45203584	0.315018979	4.8371079	4.44604646	0
1.05261497	1.41697405	4.90422167	3.54217542	2
8.56336071	0.945626207	3.6060255	2.03156603	1

3.74105525	1.67017403	4.26971717	4.78016864	0
1.13227072	0.909362729	3.80219428	5.94946466	0
7.89970075	1.40575124	4.43852095	1.96154224	0
9.75254201	0.471856722	3.9023732	4.89244077	0
4.80032853	1.41866789	3.77816003	5.6889862	0
5.44781646	1.19675026	2.33457285	2.09693122	0
0.262447738	1.66447215	3.00068362	6.42764433	0
6.79438471	0.874614624	7.04146623	3.46716895	2
7.76169217	1.79670483	3.85398109	7.07835281	1
8.40711551	0.825515884	2.46816489	3.91708697	0
2.4535558	1.04339817	5.82433818	3.93816939	0
6.92325946	1.471499	2.24486803	2.20595365	0
9.224453	1.13751608	2.96282876	6.20340062	1
3.59298926	0.867624327	5.38883867	2.98955114	0
6.19267604	0.928963025	1.18914088	4.38564634	1
9.00592068	1.18314023	2.44948711	2.76342104	1
9.970847	0.77192268	5.10057142	5.13042438	1
3.48285335	0.726984414	2.25839612	5.87388247	2
4.89780645	0.576739341	5.58342109	6.80821421	2
8.38643596	1.04654081	4.99481539	4.76851457	1
0.110557992	1.36867525	8.04223502	3.48825701	1
1.05598832	0.555311867	3.90203251	3.80323229	0
3.19289203	0.920377461	1.98224863	3.06512773	0
1.17549504	0.869303618	3.03394565	7.78252767	0
7.11474438	0.601795673	6.11458805	2.75478523	0
1.7198171	0.987655864	5.05907789	5.3649836	3
1.64179431	0.523711247	2.93698074	1.96761686	0
5.32528045	0.771467343	2.61315488	2.41250004	1
2.50533055	1.3526667	4.92064121	1.87614595	2
2.95643617	0.988417731	7.20818648	5.47750686	0
2.88531953	0.414639856	3.24339787	3.81889161	0
7.93849102	0.804189823	3.44213085	1.77504917	1
4.82503148	1.81247928	3.95847307	4.01446627	0
9.65862769	1.48418352	3.03369757	2.92653146	0
8.2397714	1.24036374	3.2637354	3.14524955	0
0.782307605	1.18375184	3.2984928	2.59318259	1
4.9228032	0.401195262	1.98492384	4.82627635	2
2.46072793	1.08849005	7.03870053	4.33961409	5
3.62174487	0.882286139	7.80209153	5.02552358	1
8.70130836	0.880008305	2.86367324	3.90460987	2
4.05649049	0.578467466	5.53197342	3.64761474	2
6.2879266	1.64114513	6.92213262	2.53934763	0
3.25249579	1.25695219	1.8495374	2.21703042	4
2.53425911	1.50013824	4.00462429	4.86665214	0
0.523936616	0.404170721	5.33698141	3.36100709	1
4.30534385	0.822745561	4.26301641	4.76648767	2
0.6067773	0.638085709	6.0757131	4.6014554	3
5.46913602	1.05457503	4.65946736	4.22937006	0
4.70382671	0.085458204	4.41129777	3.94578612	3
8.72708622	0.587465417	6.05927798	4.29002293	0

4.89250688	2.24203453	2.82572803	7.37275838	5
8.26426207	1.08772566	7.41566592	3.393762	0
7.30802981	0.478511136	5.06099449	3.76348218	1
1.64619303	1.56957573	10.2993086	1.20294249	1
9.69570451	0.56108962	4.41864286	4.03588365	0
4.77928435	1.38330033	5.10184902	5.50687595	0
5.60172732	0.954755312	5.11548238	5.12609795	0
6.50964693	1.74126837	4.42657866	3.90416532	1
0.691560148	1.17048188	4.44973289	3.68900675	1
3.22126231	1.31686595	6.12926108	2.82992625	0
0.83026733	1.43361547	3.48982014	4.37482083	0
6.56009082	0.517495629	6.61690612	1.78597812	0
9.02364987	0.946237862	2.69141677	4.23669051	1
5.85088986	0.868917719	3.59815781	3.14516731	1
0.575782354	0.873638199	2.8819856	4.17302461	0
5.03614052	0.482719475	3.13109994	7.72212662	0
0.709548239	0.188657178	1.75806556	4.45392678	2
8.9114934	0.832137178	4.06040051	4.72044702	3
9.79056205	1.20716637	4.58790979	3.0743991	0
8.74263873	0.853831721	3.0591703	3.41788959	1
9.74901822	1.23304555	5.42314203	1.705209	0
2.43164311	0.718197394	4.03392342	3.17978194	1
2.2744464	2.22246811	3.45296254	3.7562365	0
7.395129	2.15703063	6.08440396	4.74302919	0
5.18091094	1.47595476	4.00381015	2.37308914	1
5.47372486	1.39109875	4.05381449	6.80514975	2
7.93444474	1.49720792	2.67052055	3.08595709	1
1.19241148	1.37686864	3.2729374	3.26986976	2
2.94227544	0.885479974	4.07755937	5.20831966	0
0.611946804	0.851222103	3.27211397	4.74593971	1
7.5725858	1.13125564	4.55610978	2.92392758	2
5.17650589	0.887573944	5.44836062	0.774981224	0
4.20349587	0.231724351	6.01633818	3.70637037	7
0.104069123	0.395395072	2.2548055	3.69709018	0
2.47126908	0.397163075	3.93363923	4.66300613	0
9.79058486	0.509717363	3.17009641	4.08032605	1
8.56089297	0.577378502	5.19663203	5.32585022	0
0.872396198	0.896664175	3.01454397	5.1809466	1
3.52484373	0.502611591	5.30359179	6.3591696	0
6.15301252	0.748194658	10.1677764	5.31593121	7
5.87796971	0.501912512	2.54694696	5.16709584	1
2.13850478	0.94612498	3.75209252	3.16215178	3
0.893050162	0.433450516	5.84265617	3.23068438	0
6.49740647	0.930742102	2.82385357	2.0662556	0
4.48058281	0.777691144	5.92953927	5.18642014	0
5.61340191	1.93128365	2.62490327	5.9716415	0
2.52577778	0.9005186	3.15290248	6.57240359	1
5.87470451	1.17053996	3.27634585	3.63760465	0
4.04565796	0.430927815	2.0804672	2.33030052	0
4.2816687	0.064902273	3.17411244	4.71695826	1

7.95946596	0.970361965	7.01811559	6.28323665	0
6.71414397	0.65178002	5.29413438	4.08024636	0
7.38609763	0.505329352	3.34814902	6.92495777	4
1.21360736	0.198010116	6.01484073	3.16127446	1
8.23835606	1.15120607	4.0904197	5.13282552	1
0.950062273	0.356847907	7.07771337	3.59938152	2
6.7840891	1.00525058	3.9619893	8.27732436	0
8.8107097	0.338306133	3.38833611	2.90683757	0
6.31454306	1.35841821	3.35485554	5.06218784	0
8.12450304	0.944500586	2.61931761	3.71973963	0
2.94660632	0.482501626	6.25917803	2.80180924	0
9.60603796	1.54201618	2.32187694	3.58934261	0
3.50234814	1.17850351	3.47346232	3.93451364	0
9.99122249	1.38359687	4.40425188	4.28101023	2
1.7627418	1.19352662	8.88988631	3.00960578	0
0.86960841	0.597435748	3.06537369	5.2202881	6
0.551841939	0.428821747	7.57248	2.80307172	2
3.55529108	1.11620201	2.84202933	4.10771019	1
7.52146012	1.40937816	4.99015123	3.24871869	0
9.61073227	0.972352795	3.25529177	4.58096626	0
9.94165195	0.54109299	2.63598622	4.63651744	0
9.10357852	1.73122947	2.16577857	3.84343287	2
2.63575625	0.978101237	5.47060534	5.992424	0
6.7654589	0.738797569	5.75562744	4.49498457	1
8.50163525	0.285736229	2.72883131	1.23770478	0
0.695864081	0.989723603	5.41288192	3.32586743	0
1.69673576	1.39330156	7.78776075	2.08036172	1
0.07179786	1.22909278	1.81515522	4.43007659	1
4.11870542	0.111890485	5.23907729	5.88882132	1
2.35420937	0.696157333	5.25919641	5.80696333	0
5.14798605	1.05346431	2.74962033	3.48239589	0
2.04005643	0.739644211	5.65335486	3.08112282	1
0.441032681	0.548301421	2.12752256	7.28622663	1
8.74773737	0.802773997	3.3861309	3.76004345	1
1.03679739	1.44796578	6.64633878	6.6186723	4
5.85372419	0.550660374	5.53959799	5.77807277	2
4.37369894	0.879515957	3.72386263	3.99465198	0
1.72813178	0.540592269	3.00219268	3.91689345	0
3.99813756	1.49481951	2.45131012	7.0899971	1
6.73355144	1.69438527	2.55041871	3.58043879	2
0.435401353	1.02080915	4.80598732	4.49340026	1
0.856242788	0.642400031	3.93117871	4.64041956	1
7.8857612	0.397875773	2.9402414	5.42907253	0
3.47262046	1.42579575	5.40232718	0.489450115	0
6.34720958	0.930126335	5.09956597	4.30160351	1
9.23093858	0.304542106	4.13770122	4.49755935	0
3.02849618	0.829635708	3.69013165	4.29144839	0
8.31110188	1.47735061	2.76751338	5.76150973	2
7.76418797	1.71271831	3.62008074	3.48502202	0
5.61379363	0.47043377	3.94472609	4.28725005	5

1.11006708	1.11225939	4.81133744	6.78117039	0
6.26735122	1.15566122	3.19402998	2.23122021	1
0.535548881	1.43788819	5.76492926	4.86111112	0
4.37246571	0.381570368	6.97178328	3.30413128	2
5.26020673	1.45644312	6.69007981	2.19358803	1
2.29732757	0.907602216	3.49466245	3.5369806	0
7.6886295	0.630797806	2.27019825	2.28389271	0
4.41191079	0.988358979	3.96390277	2.47351634	1
2.47232793	1.24363584	7.38302905	5.11035562	0
8.50949199	1.60965662	4.07516769	1.16100942	1
9.00348385	0.549414417	4.23736221	3.1101423	0
3.54032288	1.45921565	5.19029008	3.77511768	0
6.35627229	1.17236613	4.25026841	5.67733352	0
4.19102865	0.829157982	4.13820565	6.29216733	1
9.46284282	0.822046796	2.63258164	5.38741131	3
1.36040244	1.33652273	4.64726985	5.80193678	3
7.2363256	0.619077606	6.28306902	5.55885882	1
4.30578327	0.714378846	6.61533678	5.46159708	0
5.16424013	0.327084923	4.8592603	4.7513352	6
4.7057176	0.824983829	2.43607138	4.71012779	1
1.1782899	0.429480353	3.73973737	4.15428485	2
2.0226436	0.84210124	7.79494557	3.63662823	3
8.87624749	0.614247623	6.10002291	5.24388038	0
4.56897791	0.381350751	4.27349003	3.71900809	0
8.07034875	1.18344515	3.02044947	3.82901571	0
3.99411426	0.746602258	3.9637964	4.19115995	2
0.762635237	0.521908084	4.89643671	5.66371676	3
5.59094504	0.884578839	2.76139613	2.87827417	5
2.32299062	0.954499464	2.97333157	3.67822797	0
4.72300634	0.543647753	3.23564101	5.69443097	2
0.097851453	0.133781672	2.3298951	6.30790174	2
2.31528264	1.2726825	2.66991514	6.6930118	1
4.05535982	1.68957039	4.34173452	2.42130774	0
5.36550438	1.49388304	5.56677529	4.23138121	2
8.12681695	0.499217374	3.13133424	4.31357596	2
9.94324442	0.969453795	7.30626531	3.37445122	7
2.46437514	0.622986216	2.77391268	2.84020933	1
3.84938948	1.61838845	3.24404865	3.76904746	0
3.54084297	0.755654733	5.31738639	2.99645816	4
2.41454619	0.430956217	2.20702114	4.49461814	0
0.135466345	1.22800457	4.78178736	5.59532108	0
9.96077133	0.76670965	5.69310424	1.53156807	2
4.21941195	1.22622602	4.43084403	5.40443204	1
8.77096213	1.57276346	3.67597356	3.73398646	0
2.01069467	0.655449101	4.10135275	4.2205134	0
1.72505349	0.760712435	2.47023379	3.71608048	2
0.082711438	0.839990086	5.46108909	6.17773159	2
9.0432621	0.589837017	4.21717636	2.58278556	1
6.56276723	1.05282447	2.49377199	3.70154233	2
2.94785599	0.815951504	4.22707315	3.29362801	1

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1.23758975	1.23050838	4.77993479	2.47152533	1
8.75046775	1.46731378	3.45079553	5.75438628	3
7.33351317	0.812894362	3.3960164	3.96647203	1
7.46532002	0.535707681	7.88783451	3.8048039	0
3.16654406	0.394885172	4.22786862	4.17579088	0
8.55247665	0.666829222	6.15195831	7.85533726	0
5.90818848	1.47395763	4.42383177	4.05121898	1
0.674833662	0.729700653	1.78507524	5.82605281	0
2.43725777	0.708344178	5.83932064	2.9081535	3
5.76503912	0.824273343	5.8862514	3.87589965	0
7.50233005	0.958742811	4.62874728	5.87015872	4
3.14168963	0.424588346	6.34468194	4.86294719	1
6.54724506	1.2051132	4.25721381	6.06585409	0
3.69507588	1.2082803	3.71538912	2.70552298	0
8.1839641	0.168619582	5.43872524	2.99009003	1
9.15928154	0.642431261	4.30138262	6.61497061	0
4.14907777	0.237155831	3.16574793	5.6605092	0
3.68747689	1.15861371	2.76340694	5.92459545	1
6.89995633	1.61911686	2.61363516	3.30858364	0
5.60694845	0.854648404	11.5260834	5.80581235	1
9.0184446	1.12474971	3.60326844	2.50740742	10
0.896388937	1.21962988	6.43426387	6.57561429	0
6.36782973	0.795046936	1.81367324	3.46029542	1
9.66625336	0.688976083	2.3922803	5.54918108	3
2.55917272	0.611509927	5.83878979	0.379308446	4
4.21388587	1.08201851	2.84979946	1.68189946	1
4.3166379	1.15704477	3.41132958	3.34170427	8
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0.605473844	0.917368875	3.80295588	6.01587055	2
9.12314724	0.269565149	3.18460959	0.525792929	4
3.32958854	0.542567737	4.72064594	4.83665272	0
8.44857882	0.864489764	3.53116005	4.24458099	0
1.30239038	0.891822853	5.02694119	3.16952831	0
5.46063085	1.66170849	5.18430255	4.67912025	1
9.50915217	0.961301349	5.71675989	4.15412524	1
9.52802251	0.280611222	3.31119821	4.42767184	0
0.146334751	0.211996618	10.1574467	5.394652	0
7.70890778	0.381453513	1.53220865	5.08227169	1
1.74359725	1.04190528	4.74411595	3.50428098	2
4.50194753	0.897865391	7.08138131	4.8105501	1
3.80719743	1.20823683	8.14308341	4.88142737	2
2.51855198	1.21418668	6.69990385	1.4248056	1
2.59700768	0.701219293	4.71116716	3.60247125	0
5.89287756	0.255321131	2.34436446	4.42593241	0
3.53487168	0.966462952	5.20347138	4.06481764	0
1.08924039	1.26505083	3.4339419	2.33849396	0
9.09557636	0.778191739	3.13344196	5.6377109	3
5.05805913	0.996714669	4.07735663	4.51146697	0

8.75832931	0.709846829	3.97107023	3.22900164	1
8.44683507	0.833668091	4.1619699	2.58905196	0
8.64393033	0.714381862	3.99503201	3.23534368	0
7.7772617	1.34854174	2.79029711	2.74196159	1
8.08964114	0.538454472	6.80511179	4.25056388	1
5.44234243	1.40192361	5.19744024	2.83602009	0
8.68754109	1.47783672	2.23513387	2.18126994	0
5.29221942	0.241298284	11.2142667	2.34381838	1
8.74796246	0.361619666	6.55487337	4.04927927	0
1.19536917	0.607219638	7.89336269	5.20904681	0
3.96572652	0.240206644	2.31197025	4.707545	0
9.40414005	0.359180374	5.46110179	3.13241021	0
2.00405665	2.38289632	1.93832725	3.80201658	0
4.12862757	0.837151213	6.9670844	1.21215876	0
8.69959496	0.142633537	4.01539815	5.88317116	2
7.23334774	0.971405051	6.21616927	5.43571018	1
3.95047046	1.25796928	3.00842116	4.81968306	0
6.19082234	0.716326121	7.91854378	5.12126948	1
2.06078732	0.626736455	6.03436212	2.60244047	0
0.968133621	0.512865952	6.98620776	3.39110438	1
5.97376809	0.37010027	5.27564437	2.91736937	6
9.12018954	0.461599813	7.11515038	3.2589418	3
7.8671071	0.019494177	2.64129102	3.25578686	1
6.96166716	1.49187754	10.572966	5.11002532	0
9.3294588	1.05918425	6.12891538	4.73638678	2
1.02606393	1.25397039	2.05312298	5.41874931	0
3.54711611	0.55748727	3.33544044	3.20725077	2
8.64592605	1.32179292	2.975961	4.21351393	0
2.88805722	1.36338218	4.79840885	1.10433905	3
1.07689933	1.26180683	4.30059728	5.59117137	1
8.04701965	1.31240087	3.32302906	3.64479788	4
1.81101891	0.646266214	2.92667842	2.63686135	2
2.75902421	1.33431455	1.57977796	7.20935837	0
5.64234803	0.798681555	3.55514303	4.4462961	0
1.18411053	1.2699615	3.29475722	3.97743605	1
9.22024257	1.28533212	3.6727625	5.02022046	2
7.25807913	1.70518075	5.51450662	0.283660899	0
7.24066438	0.489067859	8.68261438	5.9192364	1
6.17142845	0.546868292	3.74601682	2.58104646	0
6.58313783	0.721711734	3.29245539	4.48192452	0
4.80960728	0.914023525	1.72837359	2.72032623	4
7.46260133	0.45040248	2.78813646	4.7542453	2
1.84727961	0.593499956	3.41453606	5.46736725	0
9.61301128	0.79811135	14.2263129	4.72695212	0
6.80642909	1.05539269	2.38259919	2.12216591	0
9.95566492	1.36938509	2.73621359	3.86163363	1
0.593076316	1.45890266	4.66223004	3.5502832	0
4.473945	0.470391949	2.14973539	5.42442905	1
5.73466781	0.183193577	3.61191218	3.3244621	1
4.41172703	0.29260354	7.11226509	2.138927	1

6.73787256	1.36335364	4.42743675	1.62512017	6
7.96823131	1.52581296	3.77567131	3.64775487	2
8.4256942	1.82839284	4.33660364	5.06728028	1
2.02345992	0.246612418	3.27649025	4.46386225	0
4.69070972	0.758807444	2.43217409	4.52882644	0
4.76625075	1.85855835	1.60676608	2.42268293	0
0.571379811	1.09914872	3.00847711	4.4870208	0
1.4958918	0.599411375	7.55064294	1.72255035	0
1.89002065	1.15712797	4.5981415	2.17008862	1
2.88303697	0.407397097	2.52881469	3.03400284	1
5.15265095	0.516930443	4.08407493	2.87728272	4
8.41645417	1.3251653	4.87270092	3.2772569	1
1.46209806	0.512297069	3.69481295	5.18417266	0
6.70423479	0.345414259	5.40351589	5.62205137	1
6.09256567	0.446815677	3.57260639	4.51450463	2
3.09572585	0.665362612	3.11553646	3.39139129	0
9.08623341	0.67227343	4.40666036	1.63951156	0
0.791434576	0.917888021	5.58695283	3.02189129	2
1.25466123	0.492180749	5.51178887	5.80777144	1
4.41506894	0.972085821	5.3228753	2.85136324	2
5.20529809	0.317992804	7.15341753	3.87328113	0
5.66378127	0.571916628	4.42072469	3.7288196	3
4.33285841	0.942580535	3.33271186	3.94301492	1
3.86348195	0.036419938	2.22262337	1.89631585	0
3.10477537	0.902523653	3.91700141	2.77398563	1
9.95073295	0.976424165	2.6212938	1.65530393	1
6.168568	0.43475012	3.42305257	5.90146788	0
8.56979284	1.16147122	2.68327044	4.7218873	1
4.86502586	0.75936606	2.24062672	3.68206969	7
1.67399059	0.553433815	3.87626098	1.89369833	4
3.93832974	1.4354814	5.26274075	3.627048	3
2.93848451	1.75410233	2.80835703	2.79108849	0
7.84550659	0.747024991	6.45199447	3.34531243	3
5.6660516	0.611406149	4.07880682	3.61531436	1
6.89478891	1.20125327	2.51872108	3.59364725	1
6.50061421	1.70949947	4.61006885	1.10991936	0
8.91391287	1.08567723	5.4312866	5.49184922	0
3.44568122	1.11008493	3.91180754	5.07408218	0
0.258585245	0.896147061	4.01708794	2.45443234	1
3.64439044	0.385761636	8.09443551	2.47478048	0
0.508120195	1.09822416	3.9463628	2.9669886	0
4.0782518	1.23853342	2.96908469	2.48930682	0
3.06074202	1.82314804	4.11103234	2.67739507	1
1.18808585	0.864513288	3.63123996	3.69011575	4
8.40760222	1.19646251	3.37815256	5.65362837	2
3.540789	0.250354108	4.19178799	2.32446933	3
2.1862706	0.019799359	6.08910395	3.66545823	1
2.45168795	1.11403023	1.88916809	4.45140016	0
4.75821032	0.215959634	3.48974523	3.6132359	0
8.61778741	0.763050557	6.77572606	8.23940742	1

1.46030333	0.910050974	2.27954095	2.77839867	0
9.26249401	0.2723219	4.556838	2.596426	1
8.0177806	0.619574871	3.22399235	4.12474135	6
3.83390123	0.902128818	4.21543779	2.9481739	3
0.187093252	0.095740147	5.82874622	5.57487552	1
3.3027372	0.17452962	3.47561301	7.13791035	0
0.573002279	0.635657238	4.03699737	4.19914742	1
5.88252819	1.08773218	3.64794612	3.338215	0
0.727126051	0.923762193	3.42891843	2.30920218	4
3.1137069	0.17444919	2.2523197	3.18108403	2
5.94526879	0.473727257	2.0917052	5.25394575	2
8.63330798	0.701805618	2.86634468	2.36778711	0
4.28921729	1.4573151	8.63655878	3.78643605	1
8.39516315	1.83848633	2.89838724	3.58670235	2
2.57943877	0.908815154	2.64038262	4.83392924	1
2.28142612	0.97491385	2.87014189	6.10729132	1
3.6193168	0.944668048	1.46998151	4.83164937	2
8.77695384	0.35206028	6.51029399	6.06771856	0
4.5035194	1.08259563	4.92219285	3.59631315	1
9.33325914	0.965407664	5.22425232	2.28962045	0
0.612754966	1.66988181	4.99513525	3.90824733	0
4.57833067	0.202772152	3.27019223	3.96092131	3
1.15368793	0.531063408	2.72496966	2.29876923	0
3.29250689	1.35992866	2.44651776	3.44031757	1
7.99267462	1.96546368	4.17666552	4.36004339	0
7.08685111	1.71482507	3.38255929	2.58753964	0
0.792696187	1.07261717	5.19464635	2.29596386	4
4.95323148	0.32024931	5.74212793	6.26992351	0
4.30544808	0.828652676	5.07160794	3.600581	5
3.39787507	0.922930815	3.33183191	3.99620726	1
6.81375555	0.548655806	7.1519104	2.45554488	1
1.16050419	0.6173754	2.34321168	0.104035095	0
4.34943783	1.06095909	7.56749302	4.39344485	0
1.99962914	1.54457348	2.74196144	6.45921742	0
6.33435263	0.910274059	2.56466237	4.58043959	2
8.62708837	0.584937409	2.69055322	5.91379867	0
2.88086266	1.09901332	2.98198638	2.36854718	1
8.37638286	1.06580414	6.17146228	6.03209845	1
6.07166744	0.844724545	2.57564747	6.09939172	0
1.80422054	0.505958963	3.2044706	4.98609007	0
3.90313556	0.895594268	3.32595243	3.42444258	0
7.84960943	1.68075866	1.79534661	3.92425064	3
3.5152641	1.38329902	4.43547628	6.04154224	1
3.20340322	1.73670509	6.66544386	2.84383803	1
6.77191058	2.01529406	5.28325459	3.96561454	2
1.63757595	0.378367191	4.67245139	3.20170008	0
9.72868362	0.56395322	4.17082479	3.8405884	0
0.883759118	0.821958122	6.64034272	4.22439533	0
4.84234108	0.48660826	5.36802659	1.82457242	4
2.0965691	1.33161688	6.45774712	2.86737456	0

5.76120228	0.6375188	5.33125833	2.60062534	0
1.78446764	1.02752317	2.48864308	0.966569066	0
5.73267623	0.386287855	5.40710113	3.94524788	1
3.64989918	0.726866568	6.95718326	3.64524496	0
9.74686734	1.22718272	1.49048246	2.95907635	0
7.10868566	0.474451064	2.18693604	3.17908028	4
0.223834689	0.847531838	5.45462496	2.84263581	0
0.533790798	1.6460339	2.3472622	3.17888866	1
5.21962332	2.00451813	10.1051236	5.59201407	0
7.50796909	0.26766435	5.54282147	2.86799692	1
3.63548335	0.224690657	8.23862014	2.20434259	0
7.33935202	1.19910945	6.25062945	4.84003125	1
2.84974927	0.567033872	2.25479628	3.56815758	0
0.672443314	0.44788866	6.20249861	2.62411707	0
9.87891156	0.102833995	3.46953991	6.60376955	1
4.10128382	1.17313902	8.39687656	3.63446143	0
1.36361734	1.24723427	4.47334862	1.54141815	0
5.89055288	0.472742781	2.78806006	3.99098821	1
5.85798086	0.802512583	6.51320289	6.77051168	0
1.4656322	0.762720972	1.67882039	1.30767982	0
3.0920868	0.72356659	2.97221423	3.36995238	0
2.88382184	0.344986315	2.18424155	4.51971279	3
2.98267621	0.794680102	4.07184822	3.02487219	0
1.29404556	1.72121539	7.17437871	5.67731293	0
1.39557172	1.49281989	3.50470211	5.55606674	1
7.10523654	0.754162061	4.91849705	6.02595098	2
3.00606244	0.132172731	4.6870824	4.37385491	0
7.73646572	1.40391339	4.13533673	4.34615116	3
5.66872582	0.961532796	2.42225977	5.74593408	2
8.39528596	1.15023141	1.62435126	5.05470043	0
0.508108949	0.116113192	15.2981917	5.43700318	2
4.50898706	0.89809433	3.63980033	5.09328314	0
7.88557044	0.751674926	2.97288746	0.860384637	2
6.12371074	0.333746242	5.30316862	3.22566153	1
0.77543654	0.618644328	5.28285445	2.8621821	0
5.07239973	1.55785245	2.51774412	4.62595935	0
5.41430301	0.602596889	4.16843194	4.94727404	0
8.04286751	0.428933404	3.99292839	4.53616037	0
4.18559902	1.43481219	5.29183925	5.9611424	1
7.79446661	0.80318422	1.50170075	1.99213333	0
0.366303211	0.451442164	3.75876415	2.63599707	0
9.82734318	0.727743625	2.33355114	4.26514381	1
1.45546725	1.30805658	8.55779599	5.4797407	2
7.01929042	1.24105351	5.31376207	6.15832813	4
7.90916148	1.27039634	4.49101125	5.76307231	4
0.910462481	1.08770394	6.2903921	2.29945645	4
7.32978791	0.564198458	4.06258489	5.90245559	0
0.259959337	0.540607998	4.93896318	1.60935591	0
6.14125816	1.08374514	2.27765765	5.29755913	1
6.56865842	0.525268992	6.49556892	4.50733021	6

1.26112219	0.292931405	3.13751024	4.71375195	0
0.603993493	0.590552805	4.96111346	5.40812043	4
5.85736202	1.50029326	6.46076666	8.18592013	0
3.9333923	1.25407667	5.11822242	4.21251457	1
1.80446323	0.200508803	5.60296027	3.53258941	0
1.63389994	0.652980851	4.07380685	3.28373567	2
3.82647398	0.942252597	8.02317649	2.60443981	1
0.0126652	1.08417404	2.66724767	3.28799684	0
6.22018992	1.00938327	4.36267167	6.47995987	2
6.09822953	1.71194913	4.59865304	3.81209256	0
7.34140936	1.2685096	2.60563746	3.44039791	0
1.06864403	0.652844499	4.72937388	6.4821226	1
2.94359708	1.18911904	2.55777703	3.97368901	4
4.20101485	1.13579023	4.62390075	0.828784471	0
6.51339812	0.943831482	8.62257848	3.31284817	1
3.67299415	0.379828771	4.35074817	2.15738413	0
5.8585121	1.11418725	6.27809335	5.49433904	0
7.52812066	0.902256855	4.02844113	4.22397052	3
0.462107074	1.1961341	4.50764854	3.91460649	3
0.254724391	0.379687387	6.72914976	5.19717137	1
3.18531674	1.13403446	4.84156	1.63003362	0
5.90215705	1.26667949	5.54571186	3.10788785	0
5.76376781	1.62689007	5.46362592	5.80891839	6
8.56653152	0.459194145	3.79411631	3.76908155	3
6.06182689	0.74867125	2.43746239	5.90978973	1
0.199616505	0.903221531	3.91640025	4.98635467	6
8.11795441	0.912338209	3.79107174	6.48598393	0
0.905909452	0.156890346	7.17990321	4.91785972	3
6.85245364	1.09224966	3.34158468	0.720841921	0
1.55496217	1.45729184	3.46571834	2.24760303	2
5.64393261	0.856288031	2.38180476	6.55241631	2
5.27116637	1.04800665	2.83784928	3.24530914	0
6.41966052	1.10629456	2.40844789	5.01468475	0
4.31238243	0.231095714	2.93242581	5.28540655	0
1.24408563	0.684123929	4.15511161	4.74206825	0
2.44899154	0.652725998	5.67086394	2.84628994	2
3.78306331	0.513728965	2.8321745	1.99485631	1
4.62501031	0.946140508	3.35645584	7.42030135	5
6.48041337	0.984458304	3.43438377	6.57354994	0
5.57032279	2.20293998	4.09687875	3.37794917	0
7.37155591	0.118046564	2.3820598	4.39366971	0
9.53758663	0.139694086	2.39953539	4.08785418	1
9.00574329	1.3115354	3.73503743	4.53497805	0
4.03334347	1.97535866	3.68944908	4.29077738	0
3.94704459	1.24817333	2.35746271	4.15139475	0
6.3527407	0.448561602	2.83531422	4.3169461	0
3.76685849	0.686188782	1.69073849	3.56167994	0
9.65128293	1.60385576	2.39863414	2.9515704	0
8.15792403	0.75698291	2.53622992	5.45006829	0
1.28061756	1.79572884	3.44849066	1.59915645	0

8.27175894	1.18304399	2.02254526	3.11807696	0
8.45222719	1.34220266	5.89032155	5.33239968	1
0.149026082	0.324967212	3.63363566	7.04301315	1
6.62331336	1.08006448	4.95852263	4.19686769	3
7.55518544	0.326845714	5.97589198	5.29918156	1
4.39705298	0.98907613	3.06107625	2.9241406	1
3.54098774	1.24514964	3.57384659	4.70874952	4
2.77828011	0.121359323	5.98388902	5.77526498	0
5.87006029	1.0608313	3.10140221	-0.634524886	0
5.99606002	0.73463273	5.75362224	4.55783865	0
5.54760036	0.296323299	6.76450988	2.11024731	0
2.56562333	0.353164813	4.26645978	2.44030854	2
6.00917062	0.367610889	4.44374789	3.76428315	1
9.12805109	0.79566208	4.01756678	7.47342084	0
3.37647225	0.529230381	5.60070403	3.94465049	0
4.45896873	1.42129976	4.66399488	3.71741122	1
9.74513165	0.994323304	3.14440338	3.89460965	0
5.35052695	1.49747968	3.56882517	1.67784125	0
7.04711361	1.48879945	2.28466217	3.57782212	2
7.27123811	0.420981495	2.59458685	4.15714541	0
8.65398698	0.581352088	7.03324124	4.51173545	1
7.63620153	0.827372731	3.46802253	7.58357585	2
3.72658415	0.280960504	2.46176667	5.01791991	0
3.25032315	0.251590096	2.6123719	3.73031785	0
4.38949126	1.15006807	2.60982725	5.94084819	2
8.82781388	0.369357969	7.53798733	2.69742968	0
0.213361403	1.03686464	3.23413016	4.83526812	1
5.377618	0.748605329	6.21766914	1.95911451	1
1.51544759	0.345144736	4.77037389	3.32186212	0
4.27323134	0.734564083	3.16468374	3.0132385	1
0.586454831	0.230503791	3.53712011	4.26690032	3
2.71778326	0.351976791	2.98167108	2.11550261	5
1.80276979	1.3568167	1.68507472	2.51611118	0
0.587019888	0.230299118	3.02045563	2.06240761	0
9.37352473	1.00150271	2.55228256	3.97546412	0
3.63995045	0.401590399	5.0836849	2.00551555	0
4.08862985	1.1479894	5.3740398	3.39493119	1
7.1737724	1.7405001	3.59817743	4.02018741	2
3.7074593	1.23360029	3.06633906	7.43850885	0
6.80617982	0.400072664	4.80829383	1.58373897	0
0.550451227	1.16382206	1.87256564	4.72178814	3
4.45502409	1.2602112	1.80668097	5.15096634	0
3.08583277	0.985247991	5.27037391	4.94342042	0
6.43733725	1.0579352	1.70556395	3.05699403	1
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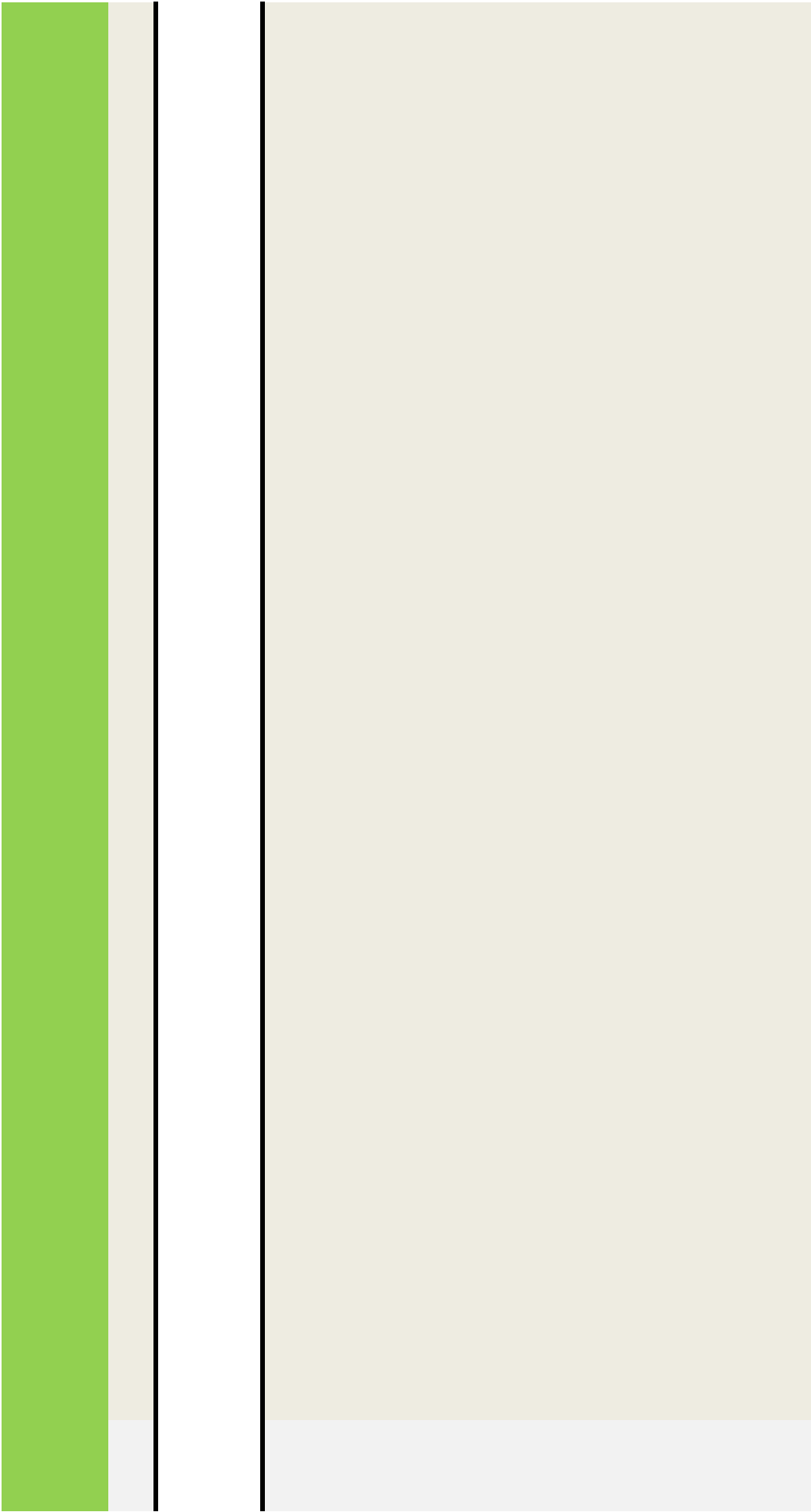
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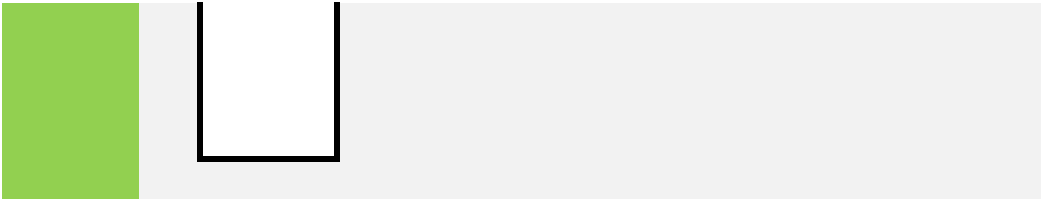
0	4
1	4
1	2
3	7
0	2
0	4
5	7
1	5
0	6
2	5
0	5
1	6
1	7
1	3
1	6
0	4
0	4
0	4
1	3
1	7
1	6
1	2
1	6
0	6
3	5
1	2
2	5
0	7
4	3
1	4
3	6
2	4
1	4
0	4
3	5
0	3
2	2
3	4
1	4
2	4
0	4
1	7
0	2
0	7
3	4
2	5
1	6
1	8
1	5
1	4

	3		7
	2		9
	1		5
	1		5
	1		4

Vygenerujte 100 normálně rozdělených hodnot o průměru 5:

--





Následující tabulka uvádí počty bodů z písemky předmětu Analýza dat na PC v letech 2010 a 2011. Testujte normalitu rozdělení obou souborů za využití Kolmogorovova-Smirnovova, Shapiro-Wilkova a Lillieforsova testu. Testujte homoskedasticitu za použití Bartlettova, Levenova nebo Brown-Forsytheova testu. Za jakých předpokladů lze použít dvojvýběrový nepárový t-test pro hodnocení pokroku? Pokud jsou podmínky splněny, otestujte, zda se na hladině významnosti 5 % změnila průměrná známka.

podzim 2010	jaro 2011
75	63
44	78
62	83
57	66
54	60
59	63
65	98
62	82
68	79
70	78
68	79
59	71
48	93
42	52
28	38
90	85
53	41
76	26
74	89
68	95
	83
	88
	68
	62
	59

Výpočet p v Excelu:

Výsledek pro p ze Statistikiy:

Průměrný zisk podzim 2010:

Průměrný zisk jaro 2011:

2010 a 2011.

Shapiro-Wilksova nebo χ^2 testu.

ra testu.

oku studentů?

úspěšnost studentů a pokud ano, určete, zda se zlepšila nebo zhoršila.

Na hladině významnosti 5 % rozhodněte o účinnosti fyzických trestů pro žáky 5. třídy na
Ověřte normalitu rozdílů.

Jak velká změna prospěchu ospravedlňuje na této hladině významnosti použití fyzických
Kolik žáků by muselo být bito, aby byl test statisticky významný na stejné hladině pravdě

Prospěch bez rákosky	Prospěch s rákoskou
2.51	2.46
2.52	2.32
1.93	1.78
1.42	1.44
2.03	2.32
3.10	3.12
1.01	1.19
1.09	1.27
2.35	2.29
2.31	2.14
2.06	2.15
1.92	2.18
1.75	1.54
2.19	2.38
2.35	1.94
2.50	2.67
2.37	2.00
2.49	2.55
2.03	2.03
1.75	1.65
1.03	1.35
1.70	1.63
2.82	2.73
2.94	2.89
1.18	1.07
2.84	2.63
1.60	1.62

Průměrný prospěch při

Průměrný prospěch po

Směrodatná odchylka p

Směrodatná odchylka p

Rozdíl prospěchů

s

stupně volnosti

$1-\alpha/2$

t 5 % hv

t výpočet

n z tabulky

Výpočet p v Excelu:

Výsledek pro p ze Stati

zlepšení jejich průměrného prospěchu.

trestů?
podobnosti?

ed bitím
bití
před bitím
po bití

--

stiky:

--

Následující tabulka obsahuje výsledky měření koncentrace fluorenu (ng/m^3) na observatoři v K
 Na hladině významnosti 5 % rozhodněte, zda lze považovat výsledky z obou měřících přístrojů :
 Jak velká je pravděpodobnost, že se dopustíme chyby 1. druhu?

1/5/2011	3.289	0.636
1/12/2011	2.412	0.2733
1/19/2011	2.099	2.021
1/26/2011	3.048	2.905
2/2/2011	7.0699	4.408
2/9/2011	1.881	3.786
2/16/2011		
2/23/2011	8.616	7.888
3/2/2011	2.385	3.935
3/9/2011	2.426	1.539
3/16/2011	0.7609	1.0873
3/23/2011		
3/30/2011	2.225	0.874
4/6/2011	0.998	0.5423
4/13/2011	0.88	0.77
4/20/2011	0.957	0.734
4/27/2011	0.95	0.627
5/4/2011	0.86	0.771
5/11/2011	0.586	0.299
5/18/2011	0.432	0.267
5/25/2011	0.392	0.3903
6/1/2011	0.38	0.344
6/8/2011	0.368	0.3
6/15/2011	0.338	0.148
6/22/2011	0.247	0.1633
6/29/2011	0.39	0.351

p-hodnota Wilcoxonova testu

ošetřících dvěma vzorkovači značek Digitel a PS-1.
za ekvivaltní.

