READER'S REPORT ON THE DIPLOMA THESIS "CLASSIFYING SPACES" BY ANTONÍN SEKERKA

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This thesis concerns classifying spaces of topological groups in algebraic topology. After some background on principle bundles, it gives a self-contained proof of the Brown representability theorem and uses this to prove the existence of classifying spaces. A wealth of examples of classifying spaces are given, focusing on the unitary and orthogonal groups. The final chapter gives a more explicit construction of the classifying space, using Quillen model structures.

The thesis covers a number of advanced topics, and includes a nice mix of abstract theory and substantial examples. It is generally well written though would be improved with a bit more background and attention to definitions and exposition. I have a few fairly minor criticisms, detailed below.

Overall, this work clearly meets the standard required of a Masters thesis and I recommend that it is passed.

Yours sincerely,
John Bourke,
Reader.

0.1. **Comments.**

(1) It would be better at the start to have the definitions of fibre bundle and map of them, so as to at least fix notation. E.g. the student writes (f, b) for a map of fibre bundles but never tells us what f or b are.
(2) On Page 5, the student defines $Fib_G(F)$ to denote a category of isomorphism classes of fiber bundles. There is no obvious category of isomorphism classes and it doesn't really make sense. I think they just mean it is a set and this is what is used in the thesis. See also Theorem 1.2.7 which refers to a one to one correspondence between categories — this should just be a bijection of sets, I believe.
(3) In the proof of Theorem 4.3.2, the author calls the topological group G a one object category when it is a one object U-enriched category. This enrichment is central to the proof, not entirely standard, and enriched categories should have been introduced and discussed earlier. This could confuse many readers.
(4) The same proof starts by saying: We use [15, Proposition 3.3] without telling us what the conditions for that result are. This is not a good style since it means the reader has to find the text and investigate.