

HEN 670 FINAL EXAM

Answer the first two questions and three of the next five. Each answer should be typed and between 300-400 words. You may consult the book but must work independently. All answers must be submitted by December 19 at 11:59 PM by email to bfath@towson.edu

- 1) What is sustainability and how has your understanding of it changed from reading the book?
 - 2) Open systems are sustained by a continuous flow of energy (almost entirely solar radiation for Earth systems). What is the role of gradients and autocatalytic cycles in this energy utilization to promoting or inhibiting sustainability?
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- 3) A core hypothesis of the book is that living systems are successful at preserving and enhancing the environmental context in which they live. We also assume (implicitly) that this happens without intentionality. What is the main mechanism that we propose to allow such synergies to emerge. Why is this missed in the standard approach?
 - 4) We are quite critical of reductionism employed in evolutionary theory throughout the book, yet the standard theory has allowed for greater understanding and great breakthrough in biological sciences. What would an holistic – environment-centered evolutionary theory look like and how might those breakthroughs be different?
 - 5) Throughout the book, we mention that machines are very useful, but not for the systemic task we have at hand. Embrace the dialectical thinking approach of Elbow, and answer the question from the position of a transcender: If the machine metaphor does not work, then it means we need better machines. What would such machines look like?
 - 6) We imagine we will achieve an organic unity and empowerment by which we and our planetary environment co-develop and co-evolve in mutually beneficial synergy such that human Life and Earth environment both improve in quality over time. Does this sound naively optimistic and idealistic? If yes, what are the main barriers? If no, what are the main signs this will happen? (Answer either yes or no, but not both)
 - 7) The book gives many new angles to the question: What is life? Chapter 7 describes the biosphere as:
“a momentary, whirlpool-like by-product of the irreversible dissipation of the sun.”
What is meant by this? Is it an example of discrete life or sustained life? How can it be implemented in biological studies and in social science studies?