

ASTR/GEOL-2040-001: Search for Life in the Universe

Homework #1

Due: Wednesday September 6, 2017

Write neatly (or use the computer), argue clearly (but don't copy from anywhere or anyone), and don't use this homework page to squeeze your answers on the margins or between the lines. Remember to staple your pages together, and don't forget to write your name! The homework is due at the *beginning* of class on Wednesday.

1. Do you think computer programs that can reproduce and evolve are alive?

- (i) Why or why not? [No more than 3 lines or arguments!]
- (ii) Would your opinion change if they could reprogram themselves?
- (iii) What if they wrote programs that operated machinery to build other computers?
- (iv) Do you think it is possible to create true life with computers?

2. We know that diseases evolve in response to the medicines designed to combat them. Explain briefly why this constitutes evidence supporting the theory of Darwinian evolution. Mention clearly the assumptions in Darwin's theory that you need for your argument.

3. Could ammonia be an alternative solvent for biomolecules than water?

- (i) Note that ammonia is only weakly polar. Could this cause problems? Explain clearly.
- (ii) Ammonia has low freezing and boiling temperatures. What would this imply for the speed of evolution of life?