Quiz 1

Name: _____

UVA Email ID: _____

For this quiz, you must **work alone**. Answer questions 1–4 (and optionally answer the ungraded question 5 if you have time).

You are not permitted to obtain help from people other than asking clarifying questions of the course staff. You are not permitted to provide help to others taking the exam. **You may not use any resources other than your brain and a simple writing implement like a pen or pencil.**

Sign below to indicate that you understand these expectations and can be trusted to behave honorably:

Signed: _____

1. What properties of DNA make it potentially a useful medium for data storage? (Provide at least 3 properties for a "green star" level answer.)

(1)

(2)

(3)

2. In George Church et al.'s paper on DNA storage (discussed in Class 11), they estimated that the storage density of DNA was 455 Exabytes per gram (a number that continues to be widely repeated). Explain at least one bad thing about this estimate?

3. Leonard Adleman's DNA computing experiment (Class 12) showed that it was possible to determine if a graph had a Hamiltonian path (a problem that is known to be NP-hard) with a running time cost that seems to scale linearly with the size of the graph.

(a) Does this result resolve the P = NP question? (If not, explain why not.)

(b) Why is this method of computation far from being of any practical value?

4. The highest value in the BLOSUM62 matrix is 11 for (W, W). What does this tell us about the amino acid represented by W (Tryptophan)?

5. (Optional, ungraded) What are the most interesting things you have learned in class so far? (Alternatively, use this space to provide feedback on any aspect of the class so far, or to draw a picture of your favorite genome-edited creature.)