1. In your own words, explain *in detail* “expected value.” Why do you think the expected value and the mean are calculated the same way?

2. One of the requirements of a probability distribution is that the sum of the probabilities must be 1 (with a small amount of leeway allowed for rounding errors). What is the justification for this requirement?

3. The binomial formula:

\[ (nC_x) \times p^x \times q^{n-x} \]

(a) (b) (c)

Explain what (a) does in the formula.
Explain what (b) does in the formula.
Explain what (c) does in the formula.
Why are they all multiplied together (as opposed to added)?

4. When trying to find the probability of getting exactly two 6’s when a die is rolled five times, why can’t the answer be found as follows: Use the rule to find the probability of getting two 6’s followed by three outcomes that are not 6, which is \((1/6)(1/6)(5/6)(5/6)(5/6)\)?

5. A researcher conducts an observational study, then uses the methods of this section to find that the mean is 5.0 while the standard deviation is -2.0. What is wrong with these results? Clearly explain your answer.

6. The probability distributions described in this chapter are discrete. What makes them discrete? What other type of probability distribution is there?

7. In the list of properties for the binomial distribution on Page 214 in your textbook, two of the properties are actually redundant. List which two and state why they are redundant.