Math 10B, Quiz 7

1. (12 points) Suppose you roll a fair six-sided die repeatedly until you get 20 threes. Define the random variable X to be the number of times you had to roll the die. What is $E[X]$? (Hint: try writing X as a sum of random variables whose expected values you can figure out.)

2. (1 point) If X and Y are random variables then $\text{Var}[X+Y] = \text{Var}[X] + \text{Var}[Y]$. ◯ True ◯ False

3. (1 point) Let X be a Poisson random variable with parameter $\lambda = 0.2$. Then for any n and $k > 0$, $P(X = n+k \mid X \geq n) = \frac{P(X=n+k)}{P(X \geq n)}$. ◯ True ◯ False

4. (1 point) On an exam, a question asks, "Suppose you draw 10 cards from a deck. What is the expected number of spades that you get?" One student gives an answer of $10 \cdot \frac{13}{52} = 2.5$ reasoning as follows: we can think of the number of spades as a random variable following the binomial distribution. The probability of success (i.e. the probability of getting a spade) when drawing one card is $\frac{13}{52}$, there are 10 trials (i.e. 10 cards are drawn) and the expected value of binomially distributed random variables is the number of trials times the probability of success.

   ◯ The student's answer is correct and their reasoning is valid.

   ◯ The student's answer is correct but their reasoning is not valid.

   ◯ The student's answer is incorrect.