For numerical answers with decimal digits please read instructions.

1. Let $X \sim$ Poisson(100) then
   (a) $\mathbb{E}[3+X]$ is _____.
   (b) SD$[4X]$ is _____.

2. Suppose we toss a fair coin till we obtain 10 heads. Let X denote the trial at which this occurs. Then
   (a) $\mathbb{E}[X]$ is _____.
   (b) Var$[X]$ is _____.

3. Let $X \sim$ Geometric$\left(\frac{1}{4}\right)$.
   (a) $\mu := \mathbb{E}[X] =$ _____.
   (b) The probability that X will be within one standard deviation of average is _____.
   Give your answer rounded up to four decimal digits.

4. Let m and r be positive integers and let N be an integer for which $N > \max\{m, r\}$. Let X be a random variable with $X \sim \text{HyperGeo}(N, r, m)$. Then which of the following is true:
   i. $\mathbb{E}[X] = \frac{mr}{N}$ and $\mathbb{E}[X^2] = \frac{mr}{N} + \frac{mr(m-1)(r-1)}{N(N-1)}$
   ii. $\mathbb{E}[X] = \frac{r}{N}$ and $\mathbb{E}[X^2] = \frac{r}{N} + \frac{m^2r^2}{N(N-1)}$
   iii. $\mathbb{E}[X] = \frac{r}{N+r}$ and $\mathbb{E}[X^2] = \frac{r}{N+r} + \frac{m^2r^2}{N(N-1)+r(r-1)}$
   iv. $\mathbb{E}[X] = \frac{N}{r}$ and $\mathbb{E}[X^2] = \frac{N}{r} + \frac{N(N-1)}{m^2r^2}$

5. Let X, Y be discrete random variables. Suppose $X \leq Y$ then it is possible that:
   i $\mathbb{E}[X] \leq \mathbb{E}[Y]$
   ii $\mathbb{E}[X] > \mathbb{E}[Y]$

6. A random variable X has a probability mass function given by
$$\mathbb{P}(X=0) = 0.2, \mathbb{P}(X=1) = 0.5, \mathbb{P}(X=2) = 0.2, \text{ and } \mathbb{P}(X=3) = 0.1.$$
   (a) $\mathbb{E}[X]$ is _____.
   Give your answer rounded up to one decimal digit.
   (b) SD$[X]$ is _____.
   Give your answer rounded up to four decimal digits.
   (c) The probability X will produce a result more than one standard deviation from its expected value is _____.
   Give your answer rounded up to one decimal digit.

7. Suppose we choose a number uniformly from $\{1, 2, 3, 4, 5, 6\}$. Let X be tthe number chosen. Then $\mu := \mathbb{E}[X] =$ _____.
Give your answer rounded up to one decimal digit.