Quiz 5

***Please write* Your name:** _____

Show all work. You should either write at a sentence explaining your reasoning, or annotate your math work with brief explanations. There is no need to simplify, and no calculators are needed.

. . . . . .

(1a) Suppose that X is a random variable with the outcomes $\{1, 2, 3\}$. The corresponding probabilities are given by

$$\mathbb{P}(X = 1) = \frac{2}{5}, \qquad \mathbb{P}(X = 2) = \frac{1}{5}, \qquad \mathbb{P}(X = 3) = \frac{2}{5}$$

Find its expected value $\mathbb{E}X$ and $\mathbb{E}X^2$

(1b) Find the variance $\mathrm{Var}(X)$

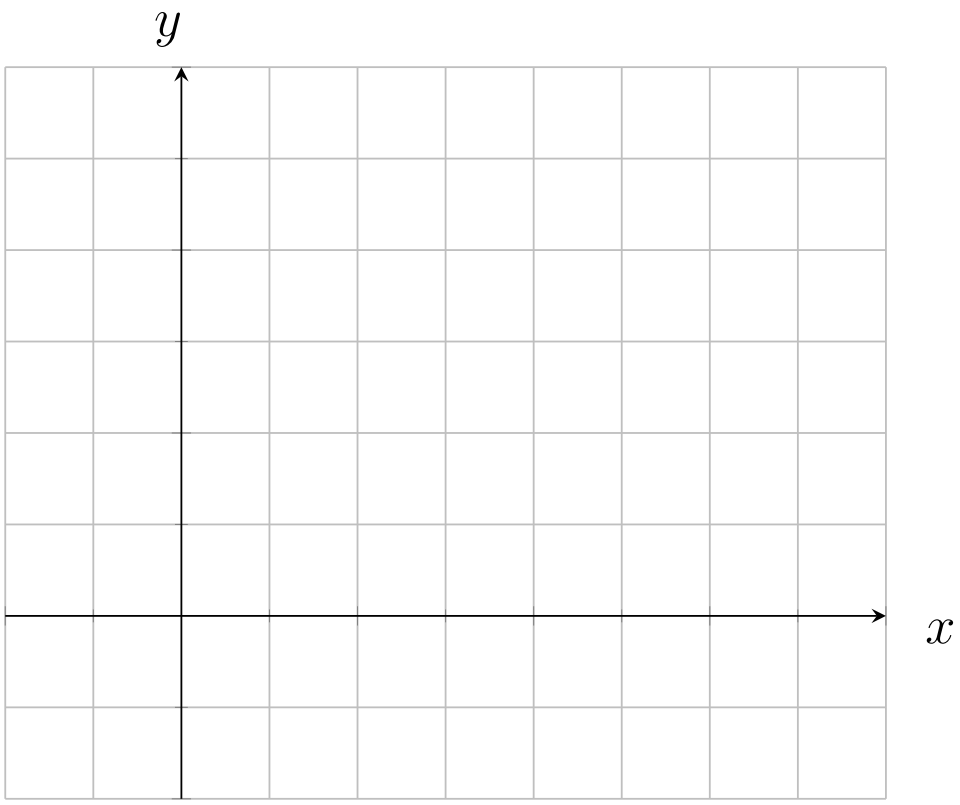
(2a) Suppose that X is a random variable with the outcomes $\{1, 2, 3\}$. The corresponding probabilities are given as in question (1) by

$$\mathbb{P}(X = 1) = \frac{2}{5}, \qquad \mathbb{P}(X = 2) = \frac{1}{5}, \qquad \mathbb{P}(X = 3) = \frac{2}{5}$$

Find the cumulative distribution function F_X of X using the cases provided below.

$$F_X(x) = \begin{cases} 0, & \text{for } -\infty < x < \_\_\_\_\_ \\ \_\_\_\_\_, & \text{for } \_\_\_\_\_ x \_\_\_\_\_ \\ \_\_\_\_\_, & \text{for } \_\_\_\_\_ x \_\_\_\_\_ \\ \_\_\_\_\_, & \text{for } \_\_\_\_\_ \leq x < \infty \end{cases}$$

(2b) Plot the cumulative distribution function F_X of X using the chart provided below. Accurately label values at x and y axes.



(3a) Toss two fair coins and define the random variable X as the number of heads. Thus, X can have values 0, 1, or 2. Find the probability mass function of X.

(3b) Find the variance of X from the previous question.