1. Let X be a Discrete Uniform random variable on $[-4, -1, 0, 1, 2]$. Let $Y = X^2$. Find $\mathbb{E}(Y)$.

2. Let X be a random variable such that $\mathbb{E}(X) = 4$. Let $Y = 2 + 3X$. Find $\mathbb{E}(Y)$.

Suppose you roll a six-sided die with a probability distribution given below. Let X be the number of spots rolled.

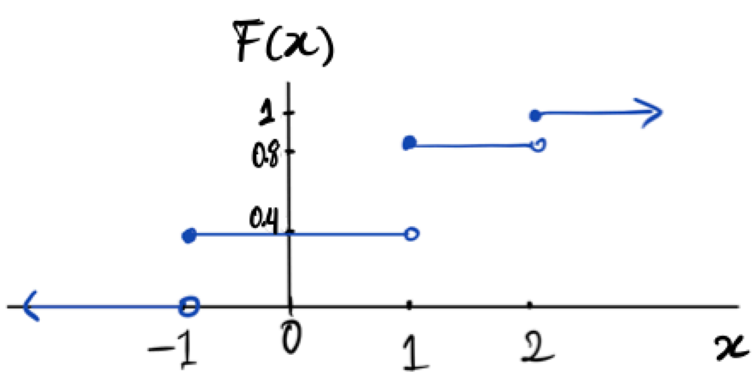
x	**1**	**2**	**3**	**4**	**5**	**6**
$P(X = x)$	$\frac{1}{10}$	$\frac{3}{10}$	$\frac{2}{10}$	$\frac{1}{10}$	$\frac{2}{10}$	$\frac{1}{10}$

3. Calculate $\mathbb{E}(X)$

4. Calculate $Var(\frac{1}{2}X + 300)$.

Given the cdf of the random variable X below:

5. compute $\mathbb{E}(X)$ and $Var(X)$.



An American roulette wheel has 38 slots: 18 red, 18 black and 2 green.

6. Let S be the number of times in 10 spins that you land on a red space. Calculate $\mathbb{E}(S)$, $Var(S)$ and $SD(S)$.

7. Write R code which will allow you to simulate 10 spins of an American roulette wheel (where your possible outcome is either *red* or *not red*), and count the number of spins that result in landing on a red space.

8. Write R code which will allow you to simulate 100 of these experiments (so 100 experiments, each featuring 10 spins of the wheel, and the number of red spaces landed on is counted in each experiment). Your output should be a vector with 100 observations, where the first element is the number of red spaced landed on in experiment one, and so on.

9. Write code to calculate the mean, variance and standard deviation of the vector you created in the last step. Then, compare them to the theoretical quantities you calculated at the start of this series of problems in one to two sentences.

Consider the random variable X whose probability mass function can be obtained from the graph in **Question 5**.

10. Write R code which will allow you to simulate 100 realizations (draws) of this random variable.

11. Write code to calculate the mean and variance of the output you created in the last step. Then, compare them to the theoretical quantities you calculated in **Question 5** in one to two sentences.