Instructions

(1) This assignment is due on Wednesday September Friday September 29th.
(2) Please submit your written solutions to crowdmark with each problem started on a separate page.
(3) Please list your collaborators on your assignment. It's important to give credit to those you have worked with.

Question 1 (Conditional Probability)**.** A box contains 5 coins. Three of these are normal coins, but two of them are fake coins where both sides are heads.

(a) Suppose you choose a coin at random, flip it, and it comes up Heads. What is the probability it is one of the fake coins?
(b) Suppose you flip two coins at random, both come up heads. What is the probability that both are fake coins?
(c) Suppose you flip two coins at random, one lands on heads, and the other lands on tails. What is the probability that the first coin is fake?

Question 2 (Random Variables)**.** For each of the following random variables, determine whether it is continuous or discrete, and determine its range (list all possible values). Explain your reasoning.

(a) The population of Canada on a randomly chosen day in history.
(b) The volume of carbon dioxide consumed by a randomly selected Oak Tree during a 24 hour period.
(c) The balance of a randomly chosen bank account.

Question 3 (Discrete Distributions)**.** Draw the probability mass function (pmf) for each random variable. On the pmf, label the expected value and one standard deviation above and below the expected value.

(a) Let $X \in \{1, 2, ..., 12\}$ with $f(x) = \frac{1}{12}$.
(b) Let $X \in \{1, 2, 3, 4, 5\}$ with

$$f(x) = \begin{cases} \frac{1}{2^x} & x \neq 5 \\ \frac{1}{2^4} & x = 5 \end{cases}$$