Homework 2 - Random Processes

---

1. Calculate the following probabilities. Justify your answers

   (a) Suppose you flip a fair coin 3 times. What is the probability of heads coming up exactly two times?

   (b) Suppose you roll two fair 6-sided dice and sum the numbers that appear. What is the probability of the sum being 9?

   (c) Suppose you roll two fair 6-sided dice and sum the numbers that appear. What is the probability of the sum being less than 6?

   (d) Suppose you roll two fair 8-sided dice and sum the numbers that appear. What is the probability of the sum being exactly 2?

   (e) Suppose you roll two fair 6-sided dice and sum the numbers that appear. What is the probability of the **complement** of the sum being greater than 10?

---

2. Calculate the expected value for the following game and give the probability of each outcome occurring. Determine whether the house or the player has the advantage. Justify your answers

   > In this game the player is asked to roll two 6-sided dice and sum the numbers appearing. It costs \$3 to play the game. If the sum is a 6, 7 or 8 the player gets \$3 and the cost to play the game is returned (that is, the payoff is \$6). If the sum is 12 the player gets \$10 and the cost to play is returned. Otherwise the player loses the \$3 it cost to play.

---

3. Calculate the following statistical measures for the exam scores given below; the data has a mean of 80.75. You can check your answers using Python (or your scientific calculator) but the formulas for each must be written down. Justify your answers

$$84, 72, 98, 88, 76, 71, 81, 76$$

   (a) Determine the median of the data.

   (b) Determine the variance of the data. Note: use the formula for data variance, that is divide by the number of data points minus one.

   (c) Determine the standard deviation for the data.
