Module 2 Assessment

Problem 2

Suppose a particular crime is committed in Jerry's apartment. We'd like to know whether Newman is guilty of the crime. We are torn as to whether we think he is guilty: we think it's equally likely that he is guilty or not guilty. Suppose that, in similar situations, we know that if a suspect is guilty, 85% of the time their finger prints are found at the scene, and, we know that if a suspect is not guilty, 30% of the time their finger prints are found at the scene.

a) What is the probability that Newman's finger prints are found at the scene? Round your answer to three decimal places. Enter your solution into variable p2.1.

```
p_a <- .5
p_a_comp <- 1-p_a
p_b_given_a <- .85
p_b_given_a_comp <- .3
p_b <- p_b_given_a*p_a + p_b_given_a_comp*p_a_comp
p2.1 = round(p_b, 3)
```

b) If Newman's finger prints are found at the scene, how likely is it that he is guilty? Round your answer to three decimal places. Enter your solution into variable p2.2.

```
p_a_given_b <- (p_b_given_a*p_a)/p_b
p2.2 = round(p_a_given_b, 3)
```

c) If Newman's finger prints are not found at the scene, how likely is it that he is guilty? Round your answer to three decimal places. Enter your answer into variable p2.3.

```
p2.3 = 0
```

Problem 3

The game of Yahtzee is played with five fair dice. The goal is to roll certain 'hands', such as Yahtzee (all five dice showing the same number) or a full house (three of a kind and two of a kind). In the first round of a player's turn, the player rolls all five dice. Based on the outcome of that roll, the player has a second and third round, where he/she can then choose to re-roll any subset of the dice to get a desired hand.

a) What is the probability of rolling a Yahtzee (all 5 dice showing the same number) on the first round? Round your answer to 4 decimal places. Enter your answer into variable `p3.1`.

```
p3.1 = 6/(6^5)
```

b) Suppose that, on the second round, the dice are {2, 3, 4, 6, 6}. You decide to re-roll both sixes in the third round. What is the probability that you roll either a small straight (exactly four dice are in a row) or a large straight (exactly five dice are in a row)? Round your answer to three decimal places. Enter your

solution into variable `p3.2`. (Note that to be "in a row" means that the dice come up with numbers that could be arranged in a row. Examples of exactly 5 numbers in a row are "1,2,3,4,5" or "2,3,4,5,6". You may want to look up small and large straights in Yhatzee if you are unfamilar with the game or confused by this terminology).

```
p3.2 = round(20/36,3)
```

c) What is the probability of rolling a small straight (exactly four dice in a row) on the first round? Round your answer to have three decimal places. Enter your solution into variable `p3.3`.

```
# prob 4 in a row - prob 5 in a row - prob 6 in a row?
p3.3 = 0
```