Practice Assignment: Conditional Probabilities

The following table below contains *Titanic* survival data.

	Survived	Died	**Total**
e Adult	373	161	**534**
ale/Child	338	1,329	**1,667**
l	**711**	**1,490**	**2,201**

1) Calculate the following probabilities to the nearest hundredth:

Part A: The probability that a randomly selected *Titanic* passenger survived

Answer: 711/2,201 ≈ 0.32

Part B: The probability that a randomly selected *Titanic* passenger survived GIVEN they were a male adult

Answer: 373/534 ≈ 0.70

Part C: The probability that a randomly selected *Titanic* passenger survived GIVEN they were not a male adult

Answer: 338/1,667 ≈ 0.20

Part D: You randomly select a *Titanic* survivor. What is the probability they were male?

Answer: 373/711 ≈ 0.52

2) Was surviving the *Titanic's* sinking independent of being a male adult? Explain.

Answer: No, they were not independent. The overall probability of survival was 711/2,201, or about 32.3%. The probability of survival given the person was a male adult was 373/534, or about 69.9%. These probabilities are not equal, so the events were not independent.

3) Assume that on 50% of days Camila rides her bike, and on 20% of days Camila goes running. Treat running and biking as mutually-exclusive events.

Part A: Complete the following table using 100 randomly selected days. Use the fact that running and biking are mutually exclusive to help you complete the table.

	Bikes	Does not bike	**Total**
Runs	0	20	**20**
Does not run	50	30	**80**
Total	**50**	**50**	**100**

Answer: Noted above in red.

Part B: Calculate the probability of Camila running OR biking on a randomly selected day. Round to the nearest hundredth.

Answer: The probability of Camila running OR biking is: (50+20)/100 = 0.7.

Part C: Given that Camila has already gone on a bike ride, calculate the probability that she goes running. Round to the nearest hundredth.

Answer: 0

4) Again, assume that on 50% of days Camila rides her bike, and on 20% of days Camila goes running. However, this time, treat running and biking as independent events.

Part A: Complete the following table using 100 randomly selected days. Use the fact that running and biking are independent to help you complete the table.

Recall that if events A and B are independent, then P(A and B) = P(A)*P(B).

	Bikes	Does not bike	**Total**
Runs	10	10	**20**
Does not run	40	40	**80**

Total	**50**	**50**	**100**

Answer: Noted above in red.

Part B: Calculate the probability of Camila running OR biking on a randomly selected day. Round to the nearest hundredth.

Answer: The probability of Camila running OR biking is: (10+10+40)/100 = 0.60.

Part C: Given that Camila has already gone on a bike ride, calculate the probability that she goes running. Round to the nearest hundredth.

Answer: 10/50 = 0.20

5) On any given day, the probability that Marco eats sushi for dinner is 20%. The probability that Marco eats pizza for dinner is 20%. Marco never eats both sushi with pizza.

Part A: Can we say that these two events (eating pizza and eating sushi) are independent? Explain.

Answer: No; eating sushi impacts his probability of eating pizza, so the events are not independent.

Part B: Can we say that these two events (eating pizza and eating sushi) are mutually exclusive? Explain.

Answer: Yes; he never eats both together, so these events are mutually exclusive.

6) Bruno has a standard deck of 52 cards. He shuffles the deck well and then draws out one card.

Part A: What is the probability the card is a heart GIVEN that it is a queen? Round to the nearest hundredth.

Answer: ¼ = 0.25, because there are four queens but only one of them is the queen of hearts

Part B: What is the probability the card is a heart GIVEN that it is red? Round to the nearest hundredth.

Answer: 13/26 = ½ = 0.5

Part C: What is the probability the card is red GIVEN that it is a heart?

Answer: 13/13 = 1

7) Anna has a standard deck of 52 cards. She shuffles the deck well and then draws out one card. It is an ace of hearts. She sets this card aside (does not put it back in the deck) and then draws a second card.

Part A: What is the probability the second card is a heart GIVEN that the first card was an ace of hearts? Round to the nearest hundredth.

Answer: 12/51 ≈ 0.24

Part B: What is the probability the second card is an ace GIVEN that the first card was an ace of hearts? Round to the nearest hundredth.

Answer: 3/51 ≈ 0.06