

Name: Solutions

Math 130

Date: 2/18/2025

Quiz 5

Some formulas you may need:

$$P(A \cup B) = P(A) + P(B)$$

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

1. (3 points) You are about to get in your car and drive to school, but there are some problems. You will barely make it to school on time if there is no traffic, otherwise you will be late. Also, your car is running low on gas and if it runs out of gas on the way to school, you will be late. So you will be late to school if there is traffic or if you run out of gas on the way. If the probability that there is traffic on the way to school is 48%, the probability that you will run out of gas on the way to school is 17%, and the probability that there will be traffic and you will run out of gas on the way to school is 9%, what is the probability that you will be late to school?

Let  $T$  be the event that there will be traffic on the way to school

Let  $R$  be the event that you will run out of gas on the way to school

$$\begin{aligned} P(T \cup R) &= P(T) + P(R) - P(T \cap R) \\ &= 48\% + 17\% - 9\% \\ &= \boxed{56\%} \end{aligned}$$

2. (3 points) Currently Rio Hondo has 721 math majors. Of these students, 108 of them are currently taking Calculus I and 73 of them are currently taking Calculus II. If a Rio Hondo math major is randomly selected, what is the probability that they are taking Calculus I or Calculus II? (Hint: A student cannot take both Calculus I and Calculus II at the same time)

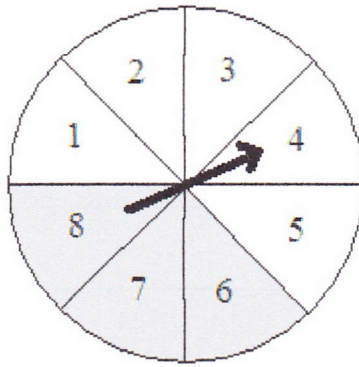
Let  $C1$  be the event that a randomly selected Rio Hondo math major is currently taking Calc. I.

Let  $C2$  be the event that a randomly selected Rio Hondo math major is currently taking Calc. II.

$$\begin{aligned} P(C1 \cup C2) &= P(C1) + P(C2) = \frac{|C1|}{|S|} + \frac{|C2|}{|S|} \end{aligned}$$

$$= \frac{108}{721} + \frac{73}{721} = \boxed{\frac{181}{721}}$$

3. (1, 2 points) Consider the experiment where you spin the spinner shown below:



Let  $W$  denote the event that the spinner lands on a white (unshaded) part of the circle, and let  $O$  be the event that the spinner lands on an odd number.

a) Find  $P(W|O)$

$$= \frac{3}{4}$$

$$\text{new } S = \{1, 3, 5, 7\}$$

b) Are  $W$  and  $O$  independent? Why or why not?

$$P(W|O) \stackrel{?}{=} P(W)$$

$$\frac{3}{4} \stackrel{?}{=} \frac{5}{8}$$

$$0.75 \stackrel{?}{=} 0.625 \quad \text{no!}$$

So  $W$  and  $O$  are  
NOT Independent.

4. (1 point) Suppose you draw 2 cards from a standard poker deck, one at a time, without replacement. Let  $R_1$  be the event that the first card drawn is red and let  $C_2$  be the event that the second card is a club. What is the probability that the second card is a club if the first card drawn is red?

$$P(C_2|R_1) = \frac{13}{51}$$