

SHOW ALL WORK AND JUSTIFY ALL ANSWERS.

1. (3 points) Experiment: Roll a pair of fair 6-sided dice. Observe the numbers on top of each die.

$$S = \{ \begin{array}{l} 11, 12, 13, 14, 15, 16 \\ 21, 22, 23, 24, 25, 26 \\ 31, 32, 33, 34, 35, 36 \\ 41, 42, 43, 44, 45, 46 \\ 51, 52, 53, 54, 55, 56 \\ 61, 62, 63, 64, 65, 66 \end{array} \}$$

- (a) Determine the event E where the sum of the number is less than five.

$$E = \{11, 12, 21, 31, 22, 13\}$$

- (b) Give the probability that one die is a 5 or the sum is 8.

$$P(\text{one die} = 5 \cup \text{sum} = 8) = \frac{14}{36}$$

2. (2 points) A child counted the number of each color of skittles in a bag of Skittles candy. The results are in the table.

Find the probability distribution for the data.

Color	Red	Yellow	Green	Purple	Orange
Frequency of Occurrence	11	9	12	7	14
Probability	$\frac{11}{53}$	$\frac{9}{53}$	$\frac{12}{53}$	$\frac{7}{53}$	$\frac{14}{53}$

$$\text{Sum} = 11 + 9 + 12 + 7 + 14 = 53$$

3. (2 points) Let E and F be two events of an experiment with sample space S . Suppose $P(E) = 0.32$, $P(F) = 0.21$, and $P(E \cap F) = 0.13$. Compute $P(E \cup F)$.

$$\begin{aligned} P(E \cup F) &= P(E) + P(F) - P(E \cap F) \\ &= .32 + .21 - .13 \\ &= .4 \end{aligned}$$



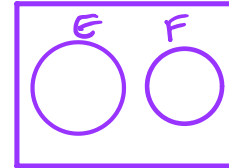
$$.19 + .13 + .08 = .4$$

4. (2 points) A traffic light is green for 40 seconds, red for 45 seconds, and yellow for 15 seconds. What is the probability of approaching the light when it is green?

$$P(\text{green}) = \frac{40}{40+45+15} = \frac{40}{100} = \frac{4}{10} = \frac{2}{5} = .4$$

5. (1 point) What does it mean if events E and F are mutually exclusive?

$$\begin{aligned} E \cap F &= \emptyset \\ P(E \cap F) &= 0 \end{aligned}$$



E & F have no elements in common.