Quiz 5

Show all your work

Name: _____

Number: _____

Signature: _____

Score: ___/17

Problem 1: Answer each question to two decimal place accuracy when appropriate. Write out steps for each.

a. If there is a 1 in 200 chance that Janette will pick the numbers correctly in President's Barbecue lottery, what is the probability she will NOT pick the numbers correctly?

$$\boxed{0.9950}$$

$1 - \frac{1}{200} = \frac{199}{200} \approx 0.9950 = 99.50\,\%$

b. The residents of Smithston and the surrounding areas are divided over the proposed construction of a dog park in town, as shown in the table. A reporter randomly selects a person to interview from a group of residents. If the person selected lives in the surrounding areas, what is the probability that the person supports the dog park?

$$\boxed{0.5291}$$

	Support dog park	Oppose dog park
Live in town	7252	6316
Live in surrounding areas	518	461

$\frac{518}{518+461} = \frac{518}{979} \approx 0.5291 = 52.91\,\%$

c. When you flip three coins, what is the probability of getting at least one heads?

$$\boxed{7/8}$$

The chance of zero heads is $\left(\frac{1}{2}\right)^3 = \frac{1}{8}$, so the chance of at least one heads is $1 - \frac{1}{8} = \frac{7}{8}$.

d. When you draw a single card from a deck of 52 cards, what is the probability of getting a red queen?

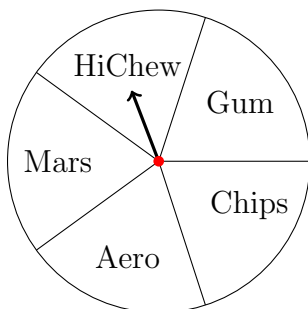$$\boxed{1/26}$$

$\frac{2}{52} = \frac{1}{26}$

e. Assume that A and B are events. If $P(A \cap B) = 0.20$, $P(A) = 0.40$, and $P(B) = 0.65$, find $P(A \cup B)$.

$$\boxed{0.85}$$

$P(A \cup B) = P(A) + P(B) - P(A \cap B) = 0.40 + 0.65 - 0.20 = 0.85.$

Score: /5

Problem 2: Dad constructed a spinner with five equal sectors the morning after Halloween for Hamlet and Samlet. Assume that the pointer never lies on a border line, answer the following questions.

a. Find the probability for the event of getting no HiChew after two spins.

$\left(\frac{4}{5}\right)^2 = \frac{16}{25} = 0.64 = 64\,\%$

b. Find the probability for the event of getting at least one Mars bar after three spins.

The chance of zero Mars bar is $\left(\frac{4}{5}\right)^3 = \frac{64}{125}$, so the chance of at least one Mars bar is $1 - \frac{64}{125} = \frac{61}{125} = 0.488 = 48.8\,\%$

Score: /4

Problem 3: Dad drew a big rectangle representing a sample space containing two events, A and B. Assume that the outcomes (as dots) were all equally likely, answer the following questions.

a. $P(B)$
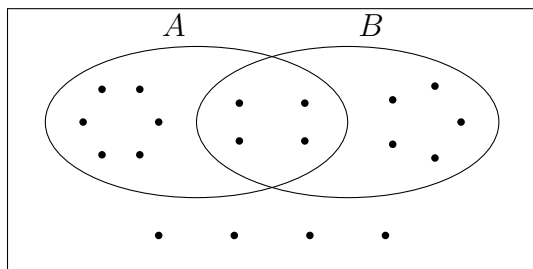
b. $P(A \cup B)$

c. $P(B \mid A)$

$$\frac{9}{19} \approx 47.4\,\%$$

$$\frac{15}{19} \approx 78.9\,\%$$

$$\frac{4}{10} = 40.0\,\%$$

d. Are A and B mutually exclusive?

$A \cap B \neq \emptyset$, so A and B are *not* mutually exclusive.

Score: /4

Problem 4: Hamlet woke up with a high fever and a bad cough. When Sam brought him to the doctor, a rapid antigen test from a throat swab sample was performed. From the table below, draw a probability tree with probabilities assigned on the branches to answer the probability of HAVING a strep throat given a negative test result.

Hint: Begin the probability tree with whether Hamlet had Strep or not before branching further for test results.

		Streptococcus	
		Have Strep A	No Strep A
Test	$+$	240	35
Results	$-$	40	4560

A total of $40 + 4560 = 4600$ people tested negative. Of those, 40 had Strep A, so the chance is $\frac{40}{4600} = \frac{1}{115} \approx 0.870\,\%$.

Score: /4