

Quiz 5

Show all your work

Name: _____
Number: _____
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Score: ____/20

Problem 1: Answer each question to three-decimal-place accuracy when appropriate. If an exact answer is possible expressed as a fraction, you may leave your answer as a fraction.

- a. If James draws a single card from a deck of 52 cards, what is $P(X \geq 5)$?

$$\frac{9}{13}$$

- b. Suppose a blue cubic die and a green cubic die are rolled, find $P(X_b - X_g \geq 3)$.

-	1	2	3	4	5	6
1	0	1	2	3	4	5
2	-1	0	1	2	3	4
3	-2	-1	0	1	2	3
4	-3	-2	-1	0	1	2
5	-4	-3	-2	-1	0	1
6	-5	-4	-3	-2	-1	0

$$\frac{1}{6}$$

- c. When you flip a fair coin three times, what is the probability of getting at least one tail?

$$\frac{7}{8}$$

$P(\text{no tails}) = P(HHH) = (1/2)^3 = 1/8$, so $P(\text{at least one tail}) = 1 - 1/8 = 7/8$.

- d. If the chance of winning a CapU's United Way Jackpot is 0.005%, find the chance in percent of not winning the jackpot.

$$99.995\%$$

Score: /4

Problem 2: Draw a spinner equally divided into 5 sectors. Label each sector one of the following options 25 cents, \$1, \$2, \$5, and \$10 so that each option is on a sector.

- Draw a sample space for spinning the spinner twice.
- Find the probability of getting more than \$5 after two spins.
- Find the probability of getting a whole number of dollars (that is, never getting 25 cents) after two spins.

The sample space is

$$\{0.25 + 0.25 = 0.50, 0.25 + 1 = 1.25, 0.25 + 2 = 2.25, 0.25 + 5 = 5.25, 0.25 + 10 = 10.25, \\ 1 + 0.25 = 1.25, \quad 1 + 1 = 2, \quad 1 + 2 = 3, \quad 1 + 5 = 6, \quad 1 + 10 = 11, \\ 2 + 0.25 = 2.25, \quad 2 + 1 = 3, \quad 2 + 2 = 4, \quad 2 + 5 = 7, \quad 2 + 10 = 12, \\ 5 + 0.25 = 5.25, \quad 5 + 1 = 6, \quad 5 + 2 = 7, \quad 5 + 5 = 10, \quad 5 + 10 = 15, \\ 10 + 0.25 = 10.25, \quad 10 + 1 = 11, \quad 10 + 2 = 12, \quad 10 + 5 = 15, \quad 10 + 10 = 20\}$$

or just

$$\{0.50, 1.25, 2.25, 5.25, 10.25, 1.25, 2, 3, 6, 11, 2.25, 3, 4, 7, 12, 5.25, 6, 7, 10, 15, 10.25, 11, 12, 15, 20\}.$$

The event "more that \$5" is then

$$\{0.50, 1.25, 2.25, 5.25, 10.25, 1.25, 2, 3, 6, 11, 2.25, 3, 4, 7, 12, 5.25, 6, 7, 10, 15, 10.25, 11, 12, 15, 20\},$$

which has probability $\frac{16}{25} = 64\%$.

The event "whole number" is

$$\{0.50, 1.25, 2.25, 5.25, 10.25, 1.25, 2, 3, 6, 11, 2.25, 3, 4, 7, 12, 5.25, 6, 7, 10, 15, 10.25, 11, 12, 15, 20\},$$

which also has probability $\frac{16}{25} = 64\%$.

Score: /5

$$/9$$

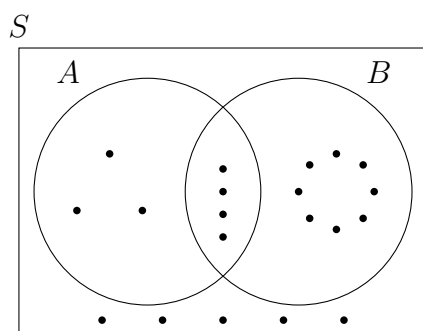
Problem 3: A survey is conducted among students and faculty at Capilano University regarding the use of artificial intelligence for students. Given that a faculty is chosen, what is the probability that the faculty is against the use of artificial intelligence for students?

Capilano University Survey			
	For AI	Against AI	Total
Students	347	151	498
Faculty	26	115	141
Total	373	266	639

$$\frac{115}{141} \approx 82\%$$

Score: /2

Problem 4: Dad drew a big rectangle representing a sample space containing Event A and Event B . Assume that the outcomes (as dots) were all equally likely, give a fraction for each probability question.



a. $P(B)$

$$\frac{12}{20} = \frac{3}{5}$$

b. $P(A \cup B)$

$$\frac{15}{20} = \frac{3}{4}$$

c. $P(\bar{A} \cap B)$

$$\frac{8}{20} = \frac{2}{5}$$

d. $P(B | A)$

$$\frac{4}{7}$$

Score: /4

Problem 5: Assume that 8% of international visitors arriving at the Vancouver International Airport are sick with ARI (Acute respiratory infections). Suppose a test correctly identifies a visitor sick with ARI 95% of the time. Also assume that the test falsely identifies a healthy visitor as sick with ARI 11% of the time. If an international visitor tests negative, what is the probability that the visitor is sick with ARI?

Draw a probability tree as part of your steps.

$$P(\text{ARI} | -) = \frac{P(\text{ARI} \cap -)}{P(-)} = \frac{0.08 \times 0.05}{0.08 \times 0.05 + 0.92 \times 0.89} = 0.004861 = 0.4861\%$$

Score: /5