Math 3201 **Chapter 3 Test** **Name:** _____

10 **Part I:** **Multiple Choice. Write the correct answer in the space provided at the end of this section.**

1. The weather forecaster says that there is a 60% probability of snow tomorrow. Determine the odds **in favour** of snow tomorrow.

(A) 3:2
(B) 2:3
(C) 5:3
(D) 3:5

60% $= \frac{60}{100} = \frac{3}{5}$ ← total fav's = 3 unfav's = 5 − 3 = 2 3 : 2

2. Nine boys and twelve girls have signed up for a trip. Only six students will be selected to go on the trip. Determine the probability that there will be an equal number of boys **and** girls on the trip.

(A) $\frac{{}_9C_3 \times {}_{12}C_3}{{}_{21}C_3}$
(B) $\frac{{}_9C_3 \times {}_{12}C_3}{{}_{21}C_6}$
(C) $\frac{{}_9C_3 + {}_{12}C_3}{{}_{21}C_6}$
(D) $\frac{{}_9C_3 + {}_{23}C_3}{{}_{21}C_3}$

total $= {}_{21}C_6$ fav $= {}_9C_3 \times {}_{12}C_3$ $P = \frac{f}{t} = \frac{{}_9C_3 \times {}_{12}C_3}{{}_{21}C_6}$

3. Which pair of events are mutually exclusive?

(A) Drawing a 9 or drawing a club from a standard deck of 52 playing cards.
(B) Rolling a sum of 5 or rolling an odd number with a pair of regular dice.
(C) Drawing a black card or a Jack from a standard of 52 playing cards.
(D) Rolling a sum of 10 or a sum of 7 with a pair of regular dice.

4. Paul has 3 toonies, 4 loonies, and 5 quarters in his pocket. He needs 2 quarters for a parking meter. He reaches into his pocket and pulls out two coins at random. Determine the probability that both coins are quarters.

(A) 0.139
(B) 0.151
(C) 0.174
(D) 0.189

$\frac{5}{12} \times \frac{4}{11} = \frac{20}{132} = 0.151$

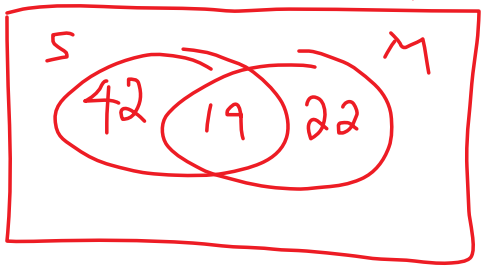
5. Elijah draws a card from a well-shuffled standard deck of 52 playing cards. Then he **puts the card back** in the deck, shuffles again, and draws another card from the deck. Determine the probability that both cards are face cards.

(A) $\frac{1}{125}$
(B) $\frac{9}{169}$
(C) $\frac{7}{99}$
(D) $\frac{4}{25}$

$\frac{12}{52} \times \frac{12}{52} = \frac{144}{2704} = \frac{9}{169}$

6. In a class survey, 61% play sports, 41% play a musical instrument, and 19% play both sports and a musical instrument. Determine the probability that someone plays neither sports nor a musical instrument.

(A) 17%
(B) 21%
(C) 79%
(D) 83%



$P(\text{sum}) = 42 + 19 + 22 = 83\%$

$P(\text{sum})' = 100 - 83 = 17\%$

7. A jar contains black and white marbles. Two marbles are chosen without replacement. The probability of selecting a black marble and then a white marble is 0.34, and the probability of selecting a black marble on the first draw is 0.47. What is the probability of selecting a white marble on the second draw, given that the first marble drawn was black?

(A) 0.13
(B) 0.16
(C) 0.72
(D) 0.91

$P(W|B) = ?$

$P(B \cap W) = 0.34$

$P(B) = 0.47$

$P(B \cap W) = P(B) \times P(W|B)$

$0.34 = 0.47 \cdot P(W|B)$

$\frac{0.34}{0.47} = \frac{0.47 \cdot P(W|B)}{0.47}$

$P(W|B) = 0.72$

$P(A \cap B) = 0$

8. A and B are mutually exclusive events. The probability that either A or B will occur, P(AUB), is 43%. If the probability of A occurring, P(A), is 26%, what is the probability of B not occurring, P(B′) ?

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

$43 = 26 + P(B)$

$P(B) = 43 - 26 = 17\%$

$P(B') = 100 - 17 = 83\%$

(A) 17%
(B) 31%
(C) 69%
(D) 83%

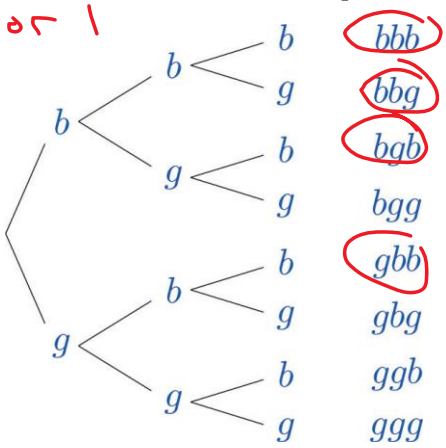
9. A fair coin is tossed twice. What is the probability of getting a head on the first toss and a tail on the second?

$P = \frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$

(A) $\frac{1}{2} + \frac{1}{2}$
(B) $\frac{1}{2} - \frac{1}{2}$
(C) $\frac{1}{2} \times \frac{1}{2}$
(D) $\frac{1}{2} \div \frac{1}{2}$

10. The tree diagram shown represents the possibilities for a couple having three children. What are the odds in favour of the couple having at most 1 girl?

at most 1 : 0 or 1



total = 8

fav = 4

unfav = 8 − 4 = 4

4 : 4

= 1 : 1

(A) 1:1
(B) 1:2
(C) 3:5
(D) 3:8

Answers to multiple choice.

1.____ **2.____** **3.____** **4.____** **5.____**

6.____ **7.____** **8.____** **9.____** **10.____**

17 **Part II:** **Constructed Response. Answer each question in the space provided. Show all workings.**

11. A Scout troop is has 6 boys and 5 girls. The leader wants 3 of the Scouts to sell tickets for a fundraiser at the mall. What is the probability these 3 Scouts consist of:

total $= {}_{11}C_3 = 165$

2 (A) 2 boys and 1 girl

fav's: ${}_6C_2 \times {}_5C_1 = 15 \times 5 = 75$

$P = \frac{f}{t} = \frac{75}{165} = 0.454$ or 45.4%

2 (B) 1 boy and 2 girls

fav's: ${}_6C_1 \times {}_5C_2 = 6 \times 10 = 60$

$P = \frac{f}{t} = \frac{60}{165} = 0.363$ or 36.3%

3 (C) at most 2 boys: 0 or 1 or 2

fav's: 0 boys ${}_6C_0 \times {}_5C_3 = 1 \times 10 = 10$

or

1 boy + 60

or

2 boys + 75

145

$P = \frac{f}{t} = \frac{145}{165} = 0.88$ or 88%

3 12. If a 6 digit password is generated at random from the letters a, b, c, d, e, f (with no repetition, lowercase and uppercase are the same), what is the probability that it begins with a vowel and ends with a vowel?

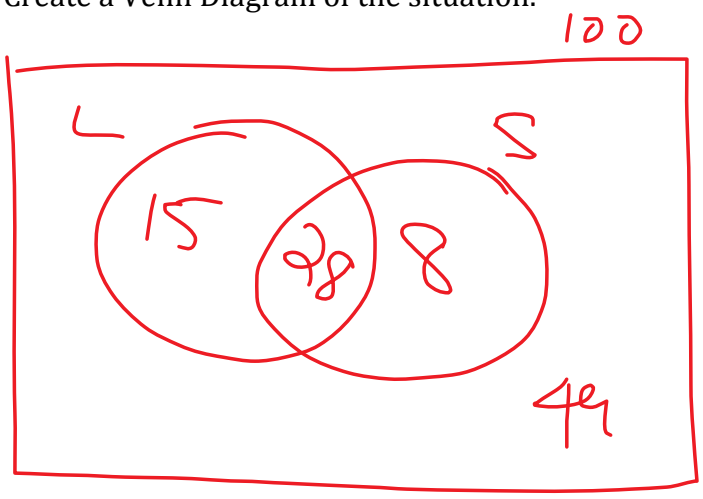
$$\text{total} = 6 \times 5 \times 4 \times 3 \times 2 \times 1 = 6! = 720$$

$$\text{fav} = \underset{a \text{ or } e}{2} \times 4 \times 3 \times 2 \times 1 \times \underset{a \text{ or } e}{1} = 48$$

$$P = \frac{f}{t} = \frac{48}{720} = 0.067 \text{ or } 6.7\%$$

13. A car manufacturer keeps a database of all the cars that are available for sale at all dealerships in Western Canada. For model A, the database reports that 43% have heated leather seats, 36% have a sunroof, and 49% have neither.

2 (A) Create a Venn Diagram of the situation.



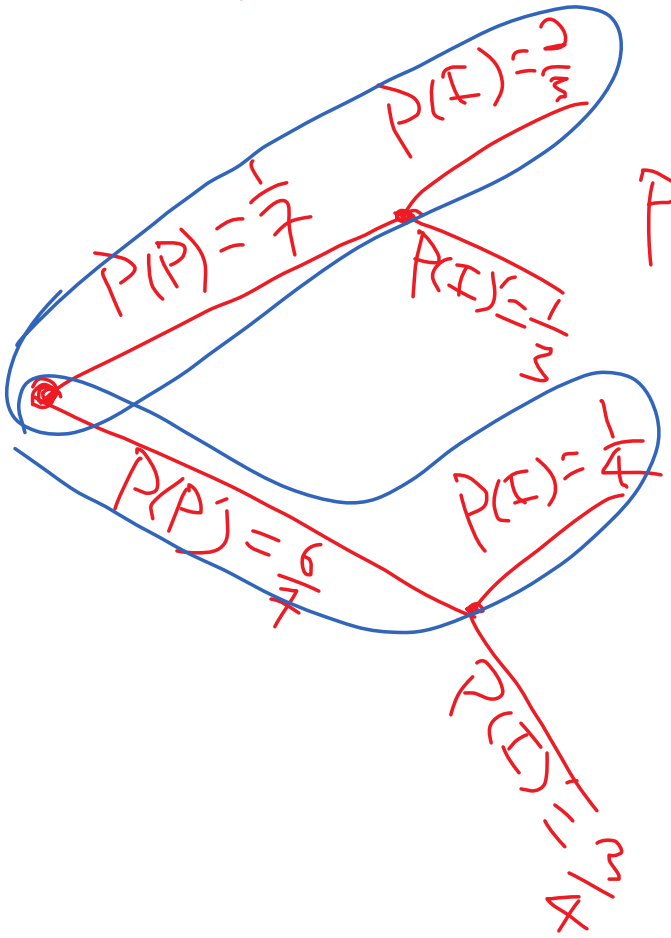
43%
+36%
+49%
128%

1 (B) Determine the probably that model A has at least one of a sunroof **or** heated seats.

$$P(L \cup S) = 15\% + 28\% + 8\% = 51\%$$

4 14. Jonas' favorite meal is pasta, followed by ice cream for dessert. Jonas' Mom cooks pasta once a week. If she cooks pasta, the probability Jonas gets ice cream for desert is $\frac{2}{3}$. If she doesn't cook pasta, then the probability Jonas gets ice cream for desert is $\frac{1}{4}$. What is the probability that Jonas gets ice cream for dessert? (Hint: A tree diagram might help.)

$P(P) = \frac{1}{7}$ $P(P)' = \frac{6}{7}$



$P(P \cap I) = \frac{1}{7} \times \frac{2}{3} = 0.095$

or

$P(P' \cap I) = \frac{6}{7} \times \frac{1}{4} = 0.214$

+

0.309

or 30.9%

Formulae:

$$ {}_nP_r = \frac{n!}{(n-r)!} $$

$$ {}_nC_r = \frac{n!}{r!\,(n-r)!} $$

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

$$ P(\text{A and B}) = P(\text{A}) \times P(\text{B}) $$

$$ P(\text{A} \cap \text{B}) = P(\text{A}) \times P(\text{B}|\text{A}) $$