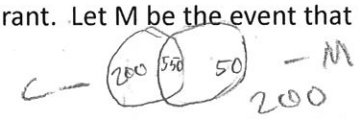
29/30

Analysis H 2022-2023 – Hahn / Hlasek / Tantod
Unit 2: Probability, Quiz 2
NO CALCULATORS

ad-venn-turous student: Justin Oh
Period: 7

1. A recent fast-food survey polled 1000 people. 600 people said they enjoy McDonald's, and 750 people said they enjoy Chik-fil-A. 200 people said they don't like either restaurant. Let M be the event that the person likes McDonald's, and let C be the event that the person likes Chick-fil-A.



If one person was randomly selected out of the group, evaluate... (answers for a-d should be simplified fractions)

a) $P(M \cap C) =$ $\frac{11}{20}$ $\frac{550}{1000} = \frac{55}{100} = \frac{11}{20}$

b) $P(M' \cup C) =$ $\frac{19}{20}$ $400+550 = \frac{950}{1000} \cdot \frac{95}{100} = \frac{19}{20}$

c) $P(M \cap C') =$ $\frac{1}{20}$

d) $P(M|C) =$ $\frac{11}{15}$ $\frac{550}{750} = \frac{55}{75} = \frac{11}{15}$

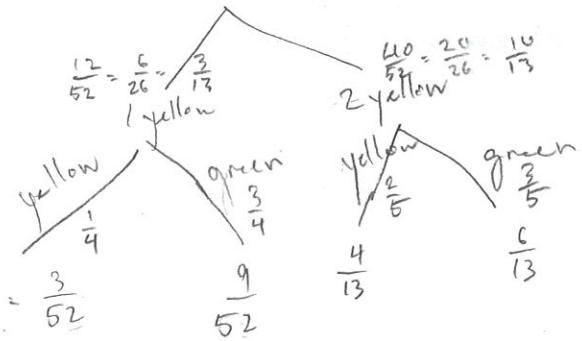
e) Answer ***True*** or ***False*** for the statement: "M and C are mutually exclusive" False

2. I have a regular deck of cards and a jar that contains 3 green marbles. I draw a single card out of the deck. If the card is a face card, I add 1 yellow marble to the jar. If the card is not a face card, I add 2 yellow marbles to the jar. Then I shake up the jar and draw a single marble from the jar. (all answers should be simplified fractions)

a) P(marble is yellow) = $\frac{19}{52}$ $\frac{3}{52} + \frac{4}{13} = \frac{3}{52} + \frac{16}{52} = \frac{19}{52}$

b) P(marble is green | card was a Queen) = $\frac{3}{4}$

c) P(card was a face card | marble is green) = $\frac{3}{11}$ $\frac{\frac{9}{52}}{\frac{33}{52}} = \frac{9}{33} = \frac{3}{11}$



F0

3. I have a regular deck of cards, and I draw 10 cards out of the deck, one at a time.

a) What is the probability that all of the cards are hearts, if each time I draw a card, I replace it back into the deck and reshuffle the deck before drawing another card? (no need to simplify)

$$\left(\frac{1}{4}\right)^{10}$$

b) What is the probability that exactly 6 of the cards are hearts, if each time I draw a card, I replace it back into the deck and reshuffle the deck before drawing another card? (no need to simplify)

$$\binom{10}{6}\left(\frac{1}{4}\right)^6\left(\frac{3}{4}\right)^4$$

c) What is the probability that exactly 6 of the cards are hearts, if each time I draw a card, I eat it (yum!) before drawing another card? (no need to simplify)

$$\frac{\binom{13}{6}\binom{39}{4}}{\binom{52}{10}}$$

4. There's a game at the county fair where you roll 2 dice. If the sum of the dice is greater than 9, you win $3. If the sum of the dice is a multiple of 4, you win $6. (By these rules, it's possible to win $9 in a single attempt). If the sum of the dice is a 3, you have to pay $18. I really wanted to try the game, but Andy and Beth were there all day, and they played the game 100 times in a row (ugh, they're so annoying).

How much total money would you expect Andy and Beth to win or lose that day? In your answer, indicate clearly whether they made money or lost money. (give your answer in dollars, to the nearest cent)

4+6 5+5 6+6 5+6 $\frac{6}{36} = \frac{1}{6}$ to make $3

1+3 2+2 3+5 4+4 6+6 2+6 $\frac{9}{36} = \frac{1}{4}$ to make $6

1+2 $\frac{2}{36} = \frac{1}{18}$ to lose $18

$\frac{1}{18}\cdot(-\$18) + \frac{1}{4}(\$6) + \frac{1}{6}(\$3)$

$= \frac{1}{2} + \frac{3}{2} - 1 = 1$

$1 \times 100 =$ They expect to make $100.00

5. Clara is designing a non-profit lottery game where there are two different buckets, each containing 10 marbles, numbered 1-10. To determine the winning numbers, one marble is drawn from each of the buckets. You buy a ticket for $1, and then select your 2 numbers. If you match exactly one of the numbers, you win $0.25. If you match both of the numbers, you win the Jackpot. How much should the jackpot be to give the game an expected value of 0? (give your answer in dollars, to the nearest cent)

2. $\frac{\binom{1}{1}\binom{9}{1}}{10^2}(\$0.25) + \frac{1}{100}(\$x) - 1 = 0$

$\frac{1}{100}x = 1 - 10.25\left(\frac{9}{100}\right)$

$x = 100\left(1 - 0.25 \cdot \frac{9}{100}\right)$

$= 100 - 0.25 \times 9$

$= \$97.75$ $95.5

$.95 \times 45 = 25 \times 14 \times 9 \times \frac{1}{100}$

$= .25 \times 171$

$= 42.75$