

Show all work on a separate sheet of paper. Leave all answers in simplest fractional form unless specified.

1. One card is selected from a standard deck of cards. $13 + 12 - 3 = 22$ $22/52 = 11/26$
- What is the probability that the card is a heart or a face card? (Ace is not a face card) $2/26 = 1/13$
 - What is $P(J|B)$? (the probability that the card is a jack, given a black card) $2/4 = 1/2$
 - What is $P(B|J)$? (the probability that the card is black, given a jack) $2/4 = 1/2$
 - What is $P(D \cap F)$? (the probability that the card is a diamond and a face card, Ace is not a face card) $3/52$
 - What is $P(x < 7)$? (the probability that the card is a 6 or less? Ace is 1) $\frac{24}{52} = \frac{12}{26} = \frac{6}{13}$

2. A bag contains 3 red marbles, 4 yellow marbles, and 5 blue marbles. Two marbles are selected from the bag without replacement.

a. Draw a tree diagram listing all possibilities and the given probabilities.

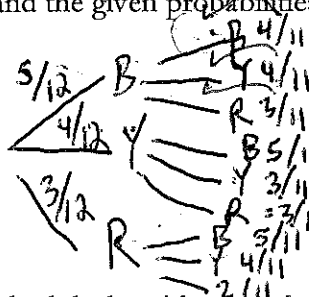
b. Find $P(Y|R)$. $4/11$

c. Find $P(R|B)$. $3/11$

d. Find $P(YY)$. $12/132$

e. Find $P(BY)$. $20/132$

$\hookrightarrow P(B), P(Y|B)$



$P(YY) = \frac{4}{12} \cdot \frac{3}{11} = \frac{12}{132}$

$P(BY) = \frac{5}{12} \cdot \frac{4}{11} = \frac{20}{132}$

3. If four cards are drawn from two well shuffled standard decks without replacement, find the probability of drawing:

a. 4 diamonds $\left(\frac{13}{52}\right) \left(\frac{12}{51}\right) \left(\frac{11}{50}\right) \left(\frac{10}{49}\right)$

b. 0 Aces $\left(\frac{48}{52}\right) \left(\frac{47}{51}\right) \left(\frac{46}{50}\right) \left(\frac{45}{49}\right)$

4. A quiz has 8 multiple-choice questions, each with 5 choices. If you randomly guess at every questions, what is the probability of getting:

a. At least 6 questions correct?

b. All eight questions correct?

c. At least 1 question correct?

\rightarrow Prob of Success $\rightarrow .2 = \frac{1}{5}$ / Fail $\rightarrow .8$

$8C6 (.2)^6 (.8)^2 + 8C7 (.2)^7 (.8)^1 + 8C8 (.2)^8 (.8)^0$

$1 - 8C0 (.2)^0 (.8)^8$

5. A bag contains 3 green marbles, 5 pink marbles, and 7 purple marbles. A marble is drawn at random from the bag. What is the probability that:

a. It is purple?

b. It is not pink?

c. It is yellow?

$7/15$

$10/15$

0

d. What are the odds of drawing a pink marble? e. What are the odds of not drawing a green marble?

\hookrightarrow In Favor : Not Favor

$5 : 10 = 1 : 2$

6. A die is rolled and a coin is tossed. List the sample space.

$\{1H, 2H, 3H, 4H, 5H, 6H, 1T, 2T, 3T, 4T, 5T, 6T\}$

7. The probability of Mr. Scevola waking up on time any one of the 5 school days is 65%.

a. What is the probability of waking up on time at least 3 days in a school week? (Leave answer in decimal form)

b. What is the probability of not waking up at least three days in a school week? (Leave answer in decimal form)

$5C3 (.65)^3 (.35)^2 + 5C4 (.65)^4 (.35)^1 + 5C5 (.65)^5 (.35)^0$

$1 - \downarrow$

8. If the probability that a child is a son is 0.4, find the probability that in a family of four children, there are:

a. Exactly two daughters.

$$4C_2 (.4)^2 (.6)^2$$

b. All sons.

$$(.4)^4$$

c. At least two sons.

$$4C_2 (.4)^2 (.6)^2 + 4C_3 (.4)^3 (.6)^1 + (.4)^4$$

9. If a coin is tossed 5 times, what is the probability:

a. Of tossing exactly 3 heads?

$$5C_3 (.5)^3 (.5)^2$$

b. Of tossing at least 4 tails?

$$5C_4 (.5)^4 (.5)^1 + 5C_5 (.5)^5 (.5)^0$$

10. Expand out $(2y^2 - 3)^4$.

$$4C_0 (2y^2)^4 (-3)^0 + 4C_1 (2y^2)^3 (-3)^1 + 4C_2 (2y^2)^2 (-3)^2 + 4C_3 (2y^2)^1 (-3)^3 + 4C_4 (2y^2)^0 (-3)^4$$

$$16y^8 - 96y^6 + 216y^4 - 432y^2 + 81$$

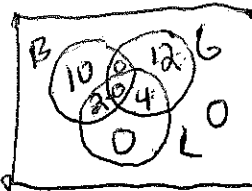
11. Find the coefficient of y^4 in $(3y + 2)^{10}$.

$$10C_6 (3y)^4 (2)^6 = 210 \cdot 81 \cdot 2^6 = 1088640 y^4$$

12 Boys

12. In class of 28 people, there are 16 girls and 6 lacrosse players. Of the lacrosse players, 4 are girls.

a. Draw a Venn Diagram of the situation.



b. If a student is randomly selected, find $P(G)$.

$$16/28$$

c. If a student is randomly selected, find $P(L|B)$.

$$2/12$$

d. If a student is randomly selected, find $P(B|L)$.

$$2/6$$

e. If a student is randomly selected, find the $P(B|G)$.

$$4/16$$

f. If a student is randomly selected, find the $P(BG)$.

$$\frac{12}{28} \cdot \frac{16}{27}$$

13. Decide if the events are independent or not.

Definition: Two events, A and B, are **independent** if the fact that A occurs does not affect the probability of B occurring.

a. Rolling two 1's on your first roll of dice and rolling two 1's on your second roll.

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b. Picking an Ace on your first pick then picking an Ace on your second pick without replacing the first card.

D (dependent)

c. Getting a 13 on your first spin of a roulette wheel and getting a 13 on your second spin of a roulette wheel.

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d. The event the first computer you select from a group of 20 computers is defective vs the second one you select is defective if you know there are exactly three defective computers.

D

→ Not replacement

14. A Canadian license plate is 3 letters followed by 3 digits. What is the probability that:

a. Your plate is three evens, followed by three letters.

$$(5^3 \cdot 26^3) / (10^3 \cdot 26^3)$$

b. Your plate is 123ABC

$$1 / (10^3 \cdot 26^3)$$

c. Your plate is ABC123

$$1 / (10^3 \cdot 26^3)$$

d. Your plate has at least one D.

$$1 - (10^3 \cdot 25^3)$$