# Math 1332 Review 2(answers)

**1.** Suppose that you reach into a bag and randomly select a piece of candy from 15 chocolates, 10 caramels, and 5 peppermints. Find the probability of:

**a)** selecting a chocolate

$$\frac{15}{15+10+5} = \frac{15}{30} = \boxed{\frac{1}{2}}$$

**b)** selecting a caramel or a peppermint

$$\frac{10+5}{15+10+5} = \frac{15}{30} = \boxed{\frac{1}{2}}$$

**c)** not selecting a peppermint

$$\frac{15+10}{15+10+5} = \frac{25}{30} = \boxed{\frac{5}{6}}$$

**2.** In a lottery, a player selects 5 different numbers from 1-20. If these five numbers match the five numbers drawn in the lottery, the player wins the top cash prize. What is the probability of winning the top cash prize:

**a)** with one ticket?

$$\frac{1}{{}_{20}C_5} = \frac{1}{\dfrac{20!}{15!\,5!}} = \boxed{\frac{1}{15,504}}$$

**b)** with 100 different tickets?

$$\frac{100}{{}_{20}C_5} = \frac{100}{\dfrac{20!}{15!\,5!}} = \boxed{\frac{100}{15,504}} = \boxed{\frac{25}{3876}}$$

**c)** with 15,504 different tickets?

$$\boxed{1}$$

**3.** A political discussion group consists of 4 Republicans and 6 Democrats. If a committee of four people is selected at random, find the probability that

**a)** all four are Democrats.

$$\frac{{}_{6}C_4}{{}_{10}C_4} = \frac{\dfrac{6!}{2!\,4!}}{\dfrac{10!}{6!\,4!}} = \frac{6!}{2!\,4!}\cdot\frac{6!\,4!}{10!} = \frac{6\cdot5\cdot4\cdot3\cdot2}{10\cdot9\cdot8\cdot7\cdot2} = \boxed{\frac{1}{14}}$$

**b)** two are Democrats and two are Republicans.

$$\frac{{}_{6}C_2 \cdot {}_{4}C_2}{{}_{10}C_4} = \frac{\dfrac{6!}{4!\,2!}\cdot\dfrac{4!}{2!\,2!}}{\dfrac{10!}{6!\,4!}} = \frac{6!}{4!\,2!}\cdot\frac{4!}{2!\,2!}\cdot\frac{6!\,4!}{10!} = \frac{6\cdot5\cdot4\cdot3\cdot2\cdot3}{10\cdot9\cdot8\cdot7} = \boxed{\frac{3}{7}}$$
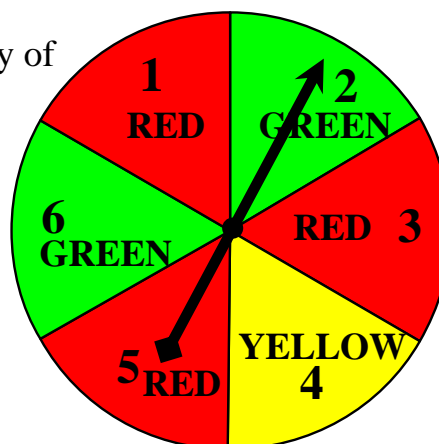
**4.** If the following spinner is spun, find the probability of

**a)** not stopping on 4.

$$\boxed{\frac{5}{6}}$$

**b)** stopping on red or yellow.

$$\frac{4}{6} = \boxed{\frac{2}{3}}$$

**c)** stopping on red or a number greater than 3.

$$\boxed{\frac{5}{6}}$$

**5.** The odds in favor of a candidate winning an election are given at 3 to 1.

**a)** What is the probability that the candidate will win the election?

$$\frac{3}{3+1} = \boxed{\frac{3}{4}}$$

**b)** What is the probability that the candidate won't win the election?

$$1 - \frac{3}{4} = \boxed{\frac{1}{4}}$$

**6.** A game is played by randomly selecting one bill from a bag that contains ten $1 bills, five $2 bills, three $5 bills, one $10 bill, and one $100 bill. The player gets to keep the selected bill.

**a)** Complete the table of amounts of money won and their probabilities:

| Amount | $1 | $2 | $5 | $10 | $100 |
|---|---|---|---|---|---|
| Probability | $\frac{1}{2}$ | $\boxed{\frac{1}{4}}$ | $\boxed{\frac{3}{20}}$ | $\boxed{\frac{1}{20}}$ | $\boxed{\frac{1}{20}}$ |

**b)** If the player must pay $20 to play this game, what is the expected value of the game?

$$1 \cdot \frac{1}{2} + 2 \cdot \frac{1}{4} + 5 \cdot \frac{3}{20} + 10 \cdot \frac{1}{20} + 100 \cdot \frac{1}{20} - 20 = \frac{10 + 10 + 15 + 10 + 100}{20} - 20$$

$$= \frac{145}{20} - 20 = \frac{145 - 400}{20} = -\frac{255}{20} = \boxed{-\$12.75}$$

**7.** A survey of 350 college students revealed the following:

| | Public College | Private College | Total |
|---|---|---|---|
| **Low income** | 120 | 20 | 140 |
| **Middle income** | 110 | 50 | 160 |
| **High income** | 22 | 28 | 50 |
| **Total** | 252 | 98 | 350 |

Find the probability that a randomly selected student from the survey

**a)** attends a public college.

$$\frac{252}{350} = \boxed{\frac{18}{25}}$$

**b)** is not from a high income family.

$$\frac{300}{350} = \boxed{\frac{6}{7}}$$

**c)** is from a middle or high income family.

$$\frac{210}{350} = \boxed{\frac{3}{5}}$$

**d)** attends a private college or is from a high income family.

$$\frac{20 + 50 + 28 + 22}{350} = \frac{120}{350} = \boxed{\frac{12}{35}}$$

**e)** attends a private college and is from a low income family.

$$\frac{20}{350} = \boxed{\frac{2}{35}}$$

**f)** attends a public college, given that the student is from a high income family.

$$\frac{22}{50} = \boxed{\frac{11}{25}}$$

**g)** attends a private college, given that the student is not from a high income family.

$$\frac{70}{300} = \boxed{\frac{7}{30}}$$

**8.** The probability of the event A occurring is .7, the probability of the event B occurring is .6, and the probability of the event $A \cap B$ occurring is .3.

  **a)** Complete the following probability diagram:
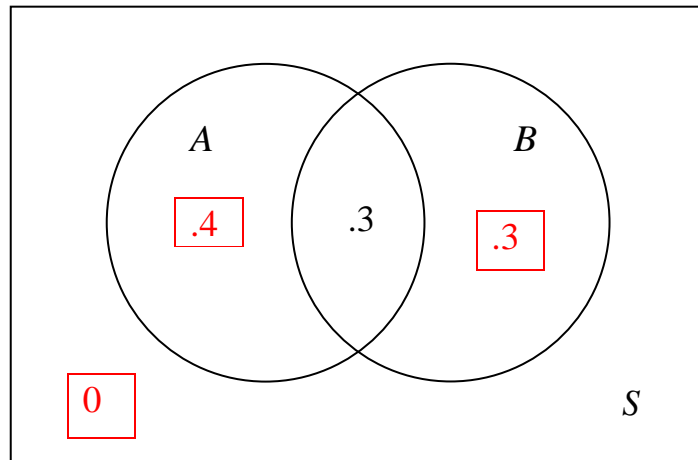


  **b)** What's the probability of the event $A \cup B$ occurring?

$$.4 + .3 + .3 = \boxed{1}$$

  **c)** What's the probability of the event $A \cap B'$ occurring?

$$\boxed{.4}$$

  **d)** What's the probability of the event $A'$ occurring?

$$\boxed{.3}$$

  **e)** What's the probability of the event $A$ occurring, given that the event $B$ will occur?

$$\frac{.3}{.6} = \boxed{.5}$$

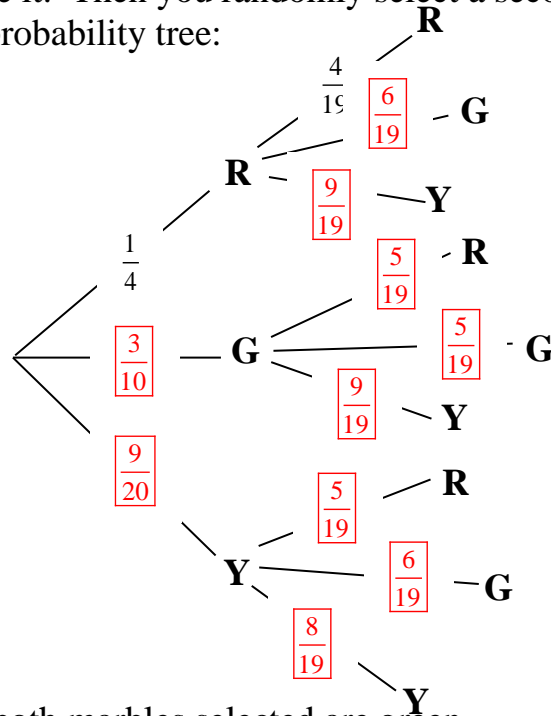  **f)** Are the events $A$ and $B$ independent?

No, since $P(A|B) = .5 \neq .7 = P(A)$.

  **g)** Are the events $A$ and $B$ mutually exclusive?

No, since $P(A \cap B) \neq 0$.

**9.** A box contains 5 red marbles, 6 green marbles, and 9 yellow marbles. You select one marble at random and do not replace it. Then you randomly select a second marble.

**a)** Complete the following probability tree:



**b)** Find the probability that both marbles selected are green.

$$\frac{3}{10} \cdot \frac{5}{19} = \boxed{\frac{3}{38}}$$

**c)** Find the probability that the second marble selected is red.

$$\frac{1}{4} \cdot \frac{4}{19} + \frac{3}{10} \cdot \frac{5}{19} + \frac{9}{20} \cdot \frac{5}{19} = \frac{1}{19} + \frac{3}{38} + \frac{9}{76} = \frac{19}{76} = \boxed{\frac{1}{4}}$$

**d)** Find the probability that the first marble selected was red given that the second marble selected is yellow.
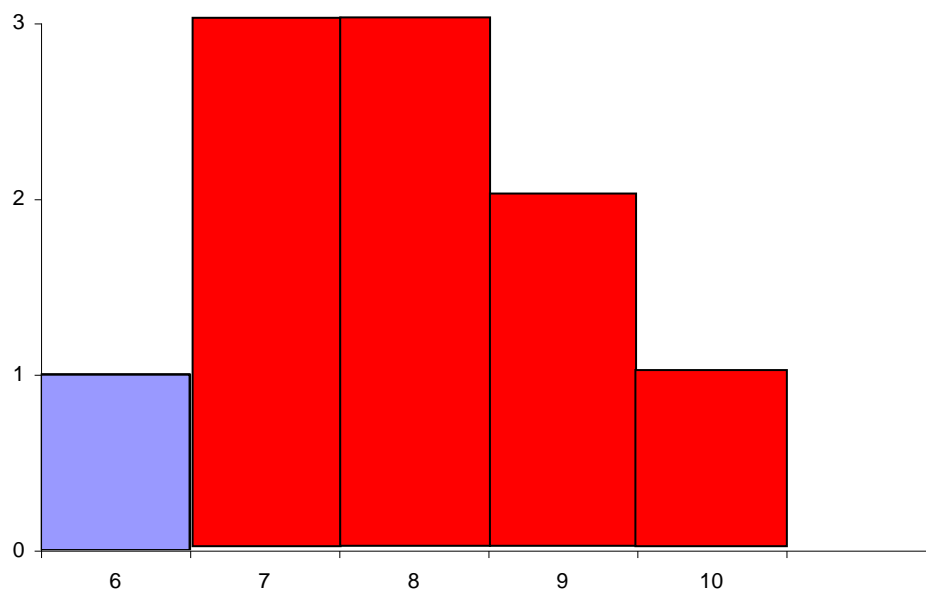
$$\frac{\frac{1}{4} \cdot \frac{9}{19}}{\frac{1}{4} \cdot \frac{9}{19} + \frac{3}{10} \cdot \frac{9}{19} + \frac{9}{20} \cdot \frac{8}{19}} = \frac{\frac{9}{76}}{\frac{9}{76} + \frac{27}{190} + \frac{18}{95}} = \frac{\frac{9}{76}}{\frac{9}{20}} = \frac{9}{76} \cdot \frac{20}{9} = \boxed{\frac{5}{19}}$$

**10.** A sample of the amount of time spent studying per week by 10 college students resulted in the following data set: $\{8,10,9,7,9,8,7,6,8,7\}$
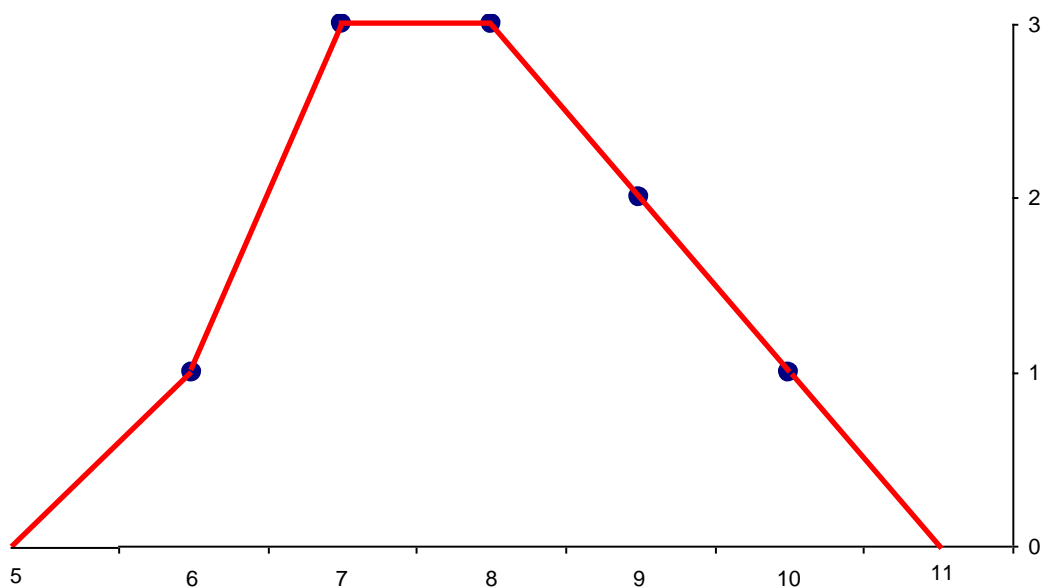
**a)** Complete the frequency distribution for the data set:

| $x$ | frequency |
|-----|-----------|
| 6 | 1 |
| 7 | 3 |
| 8 | 3 |
| 9 | 2 |
| 10 | 1 |
| Total | 10 |

**b)** Complete the histogram for the data set:



**c)** Complete the frequency polygon for the data set:



**11.** Complete the stem and leaf plot for the following data set: $\{21,45,39,21,16,14,12,28,30,47\}$.

| | | | |
|---|---|---|---|
| **1** | 6 | 4 | 2 |
| **2** | 1 | 1 | 8 |
| **3** | 9 | 0 | |
| **4** | 5 | 7 | |

**12.** Find the mean, median, mode, and the midrange for the data values in the following stem and leaf plot:

$$
\begin{array}{c|ccc}
\mathbf{1} & 1 & 3 & 5 \\
\mathbf{2} & 0 & 1 & 1 \\
\mathbf{3} & 2 & 3 & \\
\mathbf{4} & 0 & 1 & 8 \\
\end{array}
$$

$$mean = \frac{11+13+15+20+21+21+32+33+40+41+48}{11} \approx \boxed{26.8}$$

The median is the sixth value, so median $= \boxed{21}$.

$$mode = \boxed{21}.$$

$$midrange = \frac{11+48}{2} = \frac{59}{2} = \boxed{29.5}.$$

**13.** Find the mean, median, mode, and the midrange for the data values in the following frequency distribution:

| $x$ | frequency |
|---|---|
| 1 | 2 |
| 2 | 5 |
| 3 | 3 |
| 4 | 2 |
| Total | 12 |

$$mean = \frac{2 \cdot 1 + 5 \cdot 2 + 3 \cdot 3 + 2 \cdot 4}{12} = \frac{29}{12} \approx \boxed{2.4}.$$

The median is the average of the sixth and seventh values, so median $= \frac{2+2}{2} = \boxed{2}$.

$$mode = \boxed{2}.$$

$$midrange = \frac{1+4}{2} = \frac{5}{2} = \boxed{2.5}.$$