Student: ____________ **Date:** ____________	**Instructor:** Andreas Lazari **Course:** Math2620 F - Fall 2018	**Assignment:** Chapter 5.2-Homework

1. A probability experiment is conducted in which the sample space of the experiment is S = {3,4,5,6,7,8,9,10,11,12,13,14}. Let event E = {4,5,6,7,8,9} and event F = {8,9,10,11}. List the outcomes in E and F. Are E and F mutually exclusive?

List the outcomes in E and F. Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

$E \cap F = \{8, 9\}$

- (●) **A.** { 8, 9 } (Use a comma to separate answers as needed.)
- ( ) **B.** { }

Are E and F mutually exclusive?

- ( ) **A.** Yes. E and F have outcomes in common.
- ( ) **B.** Yes. E and F have no outcomes in common.
- ( ) **C.** ~~No. E and F have no outcomes in common.~~
- (●) **D.** No. E and F have outcomes in common.

2. A probability experiment is conducted in which the sample space of the experiment is S = {6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17}, event F = {9, 10, 11, 12, 13, 14}, and event G = {13, 14, 15, 16}. Assume that each outcome is equally likely. List the outcomes in F or G. Find P(F or G) by counting the number of outcomes in F or G. Determine P(F or G) using the general addition rule.

$n = 12$ $\quad P(F) = \frac{6}{12} = 0.500 \quad P(G) = \frac{4}{12} = \frac{1}{3} = 0.3$

$F \cap G = \{13, 14\} \Rightarrow P(F \cap G) = \frac{2}{12} = \frac{1}{6} = 0.166667 \approx 0.167$

List the outcomes in F or G. Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

$F \cup G = \{9, 10, 11, 12, 13, 14, 15, 16\}$

- (●) **A.** F or G = {9, 10, 11, 12, 13, 14, 15, 16} (Use a comma to separate answers as needed.)
- ( ) **B.** F or G = { }

Find P(F or G) by counting the number of outcomes in F or G.

$P(F \cup G) = \frac{8}{12} = \frac{2}{3} \approx 0.66667 \approx 0.667$

P(F or G) = 0.667

(Type an integer or a decimal rounded to three decimal places as needed.)

Determine P(F or G) using the general addition rule. Select the correct choice below and fill in any answer boxes within your choice.
(Type the terms of your expression in the same order as they appear in the original expression. Round to three decimal places as needed.)

- ( ) **A.** P(F or G) = ______ + ______ = ______
- (●) **B.** P(F or G) = 0.500 + 0.333 - 0.167 = 0.667

$P(F \cup G) = P(F) + P(G) - P(F \cap G)$

$= 0.500 + 0.333 - 0.167$

3. A probability experiment is conducted in which the sample space of the experiment is $S = \{2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13\}$, event $E = \{4, 5, 6, 7, 8\}$ and event $G = \{10, 11, 12, 13\}$. Assume that each outcome is equally likely. List the outcomes in E and G. Are E and G mutually exclusive?

List the outcomes in E and G. Choose the correct answer below. $E \cap G = \emptyset$

○ **A.** E and G = { ________ }
(Use a comma to separate answers as needed.)

● **B.** E and G = { }

Are E and G mutually exclusive?

○ **A.** No, because the events E and G have at least one outcome in common.
○ **B.** No, because the events E and G have outcomes in common.
○ **C.** Yes, because the events E and G have at least one outcome in common.
● **D.** Yes, because the events E and G have no outcomes in common.

4. A probability ~~experiment is conducted~~ $n=12$ in which the sample space of the experiment is $S = \{5,6,7,8,9,10,11,12,13,14,15,16\}$. Let event $E = \{6,7,8\}$. Assume each outcome is equally likely. List the outcomes in E^c. Find $P(E^c)$.

$P(E) = \frac{3}{12} = \frac{1}{4} = 0.250$

List the outcomes in E^c. Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

● **A.** $E^c = \{5, 9, 10, 11, 12, 13, 14, 15, 16\}$
(Use a comma to separate answers as needed.)

$E^c = \{5, 9, 10, 11, 12, 13, 14, 15, 16\}$

○ **B.** $E^c = \{\ \}$

$P(E^c) = \frac{9}{12} = \frac{3}{4} = 0.75$ or $P(E^c) = 1 - P(E) = 1 - 0.250 = 0.750$

$P(E^c) =$ 0.750 (Type an integer or a decimal rounded to three decimal places as needed.)

5. Find the probability of the indicated event if $P(E) = 0.25$ and $P(F) = 0.35$.

Find P(E or F) if P(E and F) = 0.10.

$P(E \cup F) = P(E) + P(F) - P(E \cap F)$
$= .25 + .35 - .10 = 0.5$

P(E or F) = 0.5 (Simplify your answer.)

6. Find the probability of the indicated event if $P(E) = 0.40$ and $P(F) = 0.45$.

Find P(E and F) if P(E or F) = 0.60

$P(E \cup F) = P(E) + P(F) - P(E \cap F)$
$.40 + 0.45 - 0.60 = 0.25$

P(E and F) = 0.25 (Simplify your answer.)

7. Find the probability P(E or F) if E and F are mutually exclusive, $P(E) = 0.34$, and $P(F) = 0.45$.

The probability P(E or F) is 0.79. (Simplify your answer.) $P(E \cup F) = P(E) + P(F)$
$0.34 + 0.45 = 0.79$

8. Find the probability $P(E^c)$ if $P(E) = 0.34$.

$P(E^c) = 1 - P(E) = 1 - 0.34 = 0.66$

The probability $P(E^c)$ is 0.66. (Simplify your answer.)

9. If $P(E) = 0.60$, $P(E \text{ or } F) = 0.70$, and $P(E \text{ and } F) = 0.20$, find $P(F)$.

$P(E \cup F) = P(E) + P(F) - P(E \cap F)$
$\Rightarrow P(F) = P(E \cup F) + P(E \cap F) - P(E)$
$= 0.70 + 0.20 - 0.60 = 0.3$

P(F) = 0.3 (Simplify your answer.)

10. A standard deck of cards contains 52 cards. One card is selected from the deck.

(a) Compute the probability of randomly selecting a club or spade.

(b) Compute the probability of randomly selecting a club or spade or diamond.

(c) Compute the probability of randomly selecting a ten or club.

$P(\text{club or spade}) = \frac{26}{52} = 0.500$

(a) P(club or spade) = 0.500

(Type an integer or a decimal rounded to three decimal places as needed.)

$P(C \text{ or } S \text{ or } D) = \frac{39}{52} = 0.750$

(b) P(club or spade or diamond) = 0.750

(Type an integer or a decimal rounded to three decimal places as needed.)

$P(\text{Ten or club}) = P(\text{Ten}) + P(\text{club}) - P(\text{Ten} \cap \text{club})$

(c) P(ten or club) = 0.308

(Type an integer or a decimal rounded to three decimal places as needed.)

$= \frac{4}{52} + \frac{13}{52} - \frac{1}{52} = \frac{16}{52} = 0.30769 \approx 0.308$

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11. According to a survey, the probability that a randomly selected worker primarily drives a motorcycle to work is 0.787. The probability that a randomly selected worker primarily takes public transportation to work is 0.079. Complete parts (a) through (d).

(a) What is the probability that a randomly selected worker primarily drives a motorcycle or takes public transportation to work?

They are mutually Exlusive.

$P(DM \cup PT) = P(DM) + P(PT) = 0.787 + 0.079 = 0.866.$

P(worker drives a motorcycle or takes public transportation to work) = 0.866

(Type an integer or decimal rounded to three decimal places as needed.)

Not drive motorcycle and not tak public transport

(b) What is the probability that a randomly selected worker primarily neither drives a motorcycle nor takes public transportation to work?

$P(DM^c \cap PT^c) = 1 - P(DM \cup PT) = 1 - 0.866 = 0.134$

P(worker neither drives a motorcycle nor takes public transportation to work) = ______

(Type an integer or decimal rounded to three decimal places as needed.)

(c) What is the probability that a randomly selected worker primarily does not drive a motorcycle to work?

P(worker does not drive a motorcycle to work) = 0.213

$P(DM^c) = 1 - P(DM) = 1 - 0.787 = 0.213$

(Type an integer or decimal rounded to three decimal places as needed.)

(d) Can the probability that a randomly selected worker primarily walks to work equal 0.25? Why or why not?

No, because $P(W) + P(PT) + P(DM) > 1$

- ○ **A.** Yes. If a worker did not primarily drive or take public transportation, the only other method to arrive at work would be to walk.
- ● **B.** No. The probability a worker primarily drives, walks, or takes public transportation would be greater than 1.
- ○ **C.** Yes. The probability a worker primarily drives, walks, or takes public transportation would equal 1.
- ○ **D.** No. The probability a worker primarily drives, walks, or takes public transportation would be less than 1.

12. The data in the following table show the association between cigar smoking and death from cancer for 137,792 men. Note: current cigar smoker means cigar smoker at time of death.
[1] Click the icon to view the table.
(a) If an individual is randomly selected from this study, what is the probability that he died from cancer?
(b) If an individual is randomly selected from this study, what is the probability that he was a current cigar smoker?
(c) If an individual is randomly selected from this study, what is the probability that he died from cancer and was a current cigar smoker?
(d) If an individual is randomly selected from this study, what is the probability that he died from cancer or was a current cigar smoker?

(a) P(died from cancer) = 0.007
(Round to three decimal places as needed.)

(b) P(current cigar smoker) = 0.052
(Round to three decimal places as needed.)

(c) P(died from cancer and current cigar smoker) = 0.001
(Round to three decimal places as needed.)

(d) P(died from cancer or current cigar smoker) = 0.058
(Round to three decimal places as needed.)

1: Data Table

	Died from Cancer	Did Not Die from Cancer	
Never smoked cigars	792	120,234	
Former cigar smoker	51	9,532	
Current cigar smoker	139	7,044	= 7183
	982	136810	= 137792 Total

a) $P\left(\text{Died from Cancer}\right) = \frac{982}{137792} = 0.007126 \approx 0.007$

b) $P\left(\text{Current Cigar smoker}\right) = \frac{7183}{137792} = 0.0521 2929 \approx 0.052$

c) $P\left(\text{Died from Cancer} \cap \text{Current Cigar Smoker}\right) = \frac{139}{137792} = 0.0010087 \approx 0.001$

d) $P\left(\text{died from cancer} \cup \text{Current Cigar Smoker}\right) = P(DC) + P(CCS) - P(DC \cap CCS)$

$= 0.007 + 0.052 - 0.001$

$= 0.058$

or

$= \frac{982}{137792} + \frac{7183}{137792} - \frac{139}{137792} = \frac{8026}{137792} = 0.058247$

≈ 0.058

1. A. { 8,9 } (Use a comma to separate answers as needed.)

D. No. E and F have outcomes in common.

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2. A. F or G = {9,10,11,12,13,14,15,16} (Use a comma to separate answers as needed.)

0.667

B. P(F or G) = **0.500** + **0.333** − **0.167** = **0.667**

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3. B. E and G = { }

D. Yes, because the events E and G have no outcomes in common.

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4. A. E^C = {5,9,10,11,12,13,14,15,16} (Use a comma to separate answers as needed.)

0.750

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5. 0.5

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6. 0.25

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7. 0.79

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8. 0.66

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9. 0.3

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10. 0.500

0.750

0.308

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11. 0.866

0.134

0.213

B. No. The probability a worker primarily drives, walks, or takes public transportation would be greater than 1.

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12. 0.007

0.052

0.001

0.058
