Student: _____	**Instructor:** Darryl Allen	**Assignment:** Chapter 4 Practice Exam A
Date: _____	**Course:** Elementary Statistics 60157	
Time: _____	**Book:** Triola: Elementary Statistics, 11e	

1. A statistics student wants to ensure that she is not late for an early statistics class because of a malfunctioning alarm clock. Instead of using one alarm clock, she decides to use three. What is the probability that at least one of her alarm clocks works correctly if each individual alarm clock has an 84% chance of working correctly? Does the student really gain much by using three alarm clocks instead of only one? How are the results affected if all of the alarm clocks run on electricity instead of batteries?

The probability that at least one of her alarm clocks works correctly is ☐.
(Round to four decimal places as needed.)

Does the student really gain much by using three alarm clocks instead of only one?

- ○ A. No. The clocks are not independent.
- ○ B. No. The probability of one alarm clock working is about the same as three alarm clocks working.
- ○ C. Yes. The likelihood of a functioning alarm clock increases dramatically with three alarm clocks.
- ○ D. Yes. It is three times as likely that at least one clock will work properly.

How are the results affected if all of the alarm clocks run on electricity instead of batteries?

- ○ A. The results are not affected because all clocks run on the same electricity.
- ○ B. The results change because each clock now has a new probability.
- ○ C. The results change because the alarm clocks are no longer independent.
- ○ D. The results are not affected because the alarm clocks are still independent.

2. In a genetics experiment on peas, one sample of offspring contained 356 green peas and 115 yellow peas. Based on those results, estimate the probability of getting an offspring pea that is green. Is the result reasonably close to the value of 3 / 4 that was expected?

The probability of getting a green pea is approximately ☐.
(Type an integer or decimal rounded to three decimal places as needed.)

Is this probability reasonably close to 3 / 4? Choose the correct answer below.

- ○ Yes, it is reasonably close.
- ○ No, it is not reasonably close.

3. In horse racing, a trifecta is a bet that the first three finishers in a race are selected, and they are selected in the correct order. Does a trifecta involve combinations or permutations? Explain.

Choose the correct answer below.

- ○ A. Because the order of the first three finishers does make a difference, the trifecta involves combinations.
- ○ B. Because the order of the first three finishers does not make a difference, the trifecta involves combinations.
- ○ C. Because the order of the first three finishers does make a difference, the trifecta involves permutations.
- ○ D. Because the order of the first three finishers does not make a difference, the trifecta involves permutations.

4. Pollsters are concerned about declining levels of cooperation among persons contacted in surveys. A pollster contacts 70 people in the 18-21 age bracket and finds that 35 of them respond and 35 refuse to respond. When 286 people in the 22-29 age bracket are contacted, 251 respond and 35 refuse to respond. Suppose that one of the 356 people is randomly selected. Find the probability of getting someone in the 18-21 age bracket or someone who refused to respond.

P(person is in the 18-21 age bracket or refused to respond) = ☐
(Do not round until the final answer. Then round to three decimal places as needed.)

5. If A denotes some event, what does $\overline{A}$ denote? If P(A) = 0.001, what is the value of $P(\overline{A})$? If P(A) = 0.001, is $\overline{A}$ unusual?

What does $\overline{A}$ denote?

- ○ A. Event $\overline{A}$ denotes the complement of event A, meaning that $\overline{A}$ and A share some but not all outcomes.
- ○ B. Event $\overline{A}$ denotes the complement of event A, meaning that $\overline{A}$ consists of all outcomes in which event A does not occur.
- ○ C. Event $\overline{A}$ is always unusual.
- ○ D. Events A and $\overline{A}$ share all outcomes.

If P(A) = 0.001, what is the value of $P(\overline{A})$?

$P(\overline{A})$ = ☐ (Type an integer or a decimal.)

If P(A) = 0.001, is $\overline{A}$ unusual?

- ○ No
- ○ Yes

6. Many newspapers carry a certain puzzle in which the reader must unscramble letters to form words. How many ways can the letters of WULAF be arranged? Identify the correct unscrambling, then determine the probability of getting that result by randomly selecting one arrangement of the given letters.

How many ways can the letters of WULAF be arranged?

☐

What is the correct unscrambling of WULAF?

- ○A. LAWFU
- ○B. WALUF
- ○C. FLAUW
- ○D. AWFUL

What is the probability of coming up with the correct unscrambling through random letter selection?

☐ (Type an integer or simplified fraction as needed.)

7. In a survey of consumers aged 12 and older, respondents were asked how many cell phones were in use by the household. Among the respondents, 204 answered "none," 288 said "one," 357 said "two," 153 said "three," and 78 responded with four or more. Find the probability that a randomly selected household has four or more cell phones in use. Is it unusual for a household to have four or more cell phones in use? Consider an event to be unusual if its probability is less than or equal to 0.05.

P(four or more cell phones) = ☐
(Round to three decimal places as needed.)

Is it unusual for a household to have four or more cell phones in use?

- ○A. No, because the probability of a respondent with four or more cell phones in use is less than or equal to 0.05.
- ○B. No, because the probability of a respondent with four or more cell phones in use is greater than 0.05.
- ○C. Yes, because the probability of a respondent with four or more cell phones in use is less than or equal to 0.05.
- ○D. Yes, because the probability of a respondent with four or more cell phones in use is greater than 0.05.

8. The probability of a randomly selected car crashing during a year in a certain country is 0.0469. If a family has four cars, find the probability that at least one of them has a car crash during a year. Is there any reason why the probability might be wrong?

The probability that at least one of them has a crash during the year is ☐.
(Round to four decimal places as needed.)

Is there a reason why the probability might be wrong?

- ○ A. Yes, one outcome has an effect on later trials.
- ○ B. No, the four cars are representative of all cars in the country.
- ○ C. No, one outcome does not have an effect on later trials.
- ○ D. Yes, the four cars are not randomly selected.

9. A professional basketball star who had a reputation for being a poor free throw shooter made 5060 of the 9806 free throws that he attempted, for a success ratio of 0.516. A simulation was developed to generate random numbers between 1 and 1000. An outcome of 1 through 516 was considered to be a free throw that is made, and an outcome of 517 through 1000 was considered to be a free throw that is missed. The list below shows the results for five generated numbers where 1 represents a free throw that was made and 0 represents a free throw that was missed. Complete parts (a) and (b).

0 0 1 1 1

a. Is the proportion of successful free throws P from the simulation reasonably close to the value of 0.516?

- ○ Yes, P is reasonably close to the value of 0.516.
- ○ No, P is not reasonably close to the value of 0.516.

b. The simulation was conducted 10 times to generate five results R1, R2, R3, R4 and R5 each time, as shown in the table below. Determine the proportion of successful free throws P in each case.

Case	R1	R2	R3	R4	R5	P
1	0	0	1	1	1	
2	0	1	0	0	1	
3	0	0	0	0	1	
4	0	1	0	1	0	
5	1	0	1	0	1	
6	0	1	0	0	0	
7	1	0	0	0	1	
8	1	0	1	0	0	
9	0	1	1	1	1	
10	1	0	0	1	1	

(Type integers or decimals.)

Based on the above results, would it be unusual for the professional basketball star to make all of five free throws in a game?

- ○ Yes
- ○ No

10. Determine the written description of the complement of the given event.

When six job applicants are tested, at least one of them tests positive.

Choose the correct answer below.

- ○ A. All of them test positive
- ○ B. All of them test negative
- ○ C. None of them test negative
- ○ D. More than one of them test negative

11. A single trial of some procedure is conducted and the resulting events are analyzed. Describe what it means for two events in a single trial to be disjoint.

Choose the correct answer below.

- ○ A. The events always happen at the same time.
- ○ B. The events cannot happen at the same time.
- ○ C. The events cannot combine two or more simple events.
- ○ D. The events combine two or more simple events.

12. Describe what the notation $P(B|A)$ represents.

Choose the correct answer below.

- ○ A. The probability of event B and event A occurring.
- ○ B. The probability of event B occurring, given that event A has already occurred.
- ○ C. The probability of event B or event A occurring.
- ○ D. The probability of event A occurring, given that event B has already occurred.

13. To the right are the outcomes that are possible when a couple has three children. Refer to that list, and find the probability of each event.
a. Among three children, there are exactly 3 boys.
b. Among three children, there are exactly 2 boys.
c. Among three children, there are exactly 0 boys.

1st	2nd	3rd
boy	boy	boy
boy	boy	girl
boy	girl	boy
boy	girl	girl
girl	boy	boy
girl	boy	girl
girl	girl	boy
girl	girl	girl

a. What is the probability of exactly 3 boys out of three children?

☐ (Type an integer or a simplified fraction.)

b. What is the probability of exactly 2 boys out of three children?

☐ (Type an integer or a simplified fraction.)

c. What is the probability of exactly 0 boys out of three children?

☐ (Type an integer or a simplified fraction.)

14. In designing an experiment involving a treatment applied to 6 test subjects, researchers plan to use a simple random sample of 6 subjects selected from a pool of 29 available subjects. (Recall that with a simple random sample, all samples of the same size have the same chance of being selected.) Answer the questions below.

a. How many different simple random samples are possible?

☐

b. What is the probability of each simple random sample in this case?

☐ (Type an integer or a simplified fraction.)

15. Use the data in the following table, which summarizes results from 87 pedestrian deaths that were caused by accidents. If two different deaths are randomly selected, find the probability that they both involved intoxicated drivers.

		Pedestrian Intoxicated?	
		Yes	No
Driver Intoxicated?	Yes	61	12
	No	6	8

The probability is ☐. (Round to four decimal places as needed.)

16. The principle of redundancy is used when system reliability is improved through redundant or backup components. Assume that your alarm clock has a 0.885 probability of working on any given morning and answer the questions below.

a. What is the probability that your alarm clock will not work on the morning of an important final exam?

☐ (Type an exact answer in simplified form.)

b. If you have two such alarm clocks, what is the probability that they both fail on the morning of an important final exam?

☐ (Type an exact answer in simplified form.)

c. With one alarm clock, you have a 0.885 probability of being awakened. What is the probability of being awakened if you use two alarm clocks?

☐ (Type an exact answer in simplified form.)

d. Does a second alarm clock result in greatly improved reliability?

○A. Yes, total malfunction would not be impossible, but it would be unusual.

○B. No, total malfunction would still not be unusual.

○C. Yes, you can always be certain that at least one alarm clock will work.

○D. No, the malfunction of both is equally or more likely than the malfunction of one.

17. The data in the following table summarizes blood groups and Rh types for 100 typical people. If one person is randomly selected, find the probability of getting someone who is not group O.

		Group			
		O	A	B	AB
Type	Rh^+	36	31	8	5
	Rh^-	7	9	2	2

P(person selected is not group O) = ☐
(Do not round until the final answer. Then round to three decimal places as needed.)

18. Find the probability of winning a lottery with the following rule.

Select the five winning numbers from 1, 2, . . . , 23. (In any order. No repeats.)

P(winning) = ☐ (Type an integer or a simplified fraction.)

19. Answer the following questions.

a. If P(A) = 0.54, find the complement of A, $P(\overline{A})$.
b. A certain group of women has a 0.01% rate of red/green color blindness. If a woman is randomly selected, what is the probability that she does not have red/green color blindness?

a. $P(\overline{A})$ = ☐ (Type an exact answer in simplified form.)

b. What is the probability that the woman selected does not have red/green color blindness?
☐ (Type an exact answer in simplified form.)

20. In a county, 48% of the adults are males. One adult is randomly selected for a survey involving credit card usage.

a. Find the prior probability that the selected person is a female.
b. It is later learned that the selected survey subject was smoking a cigar. Also, 8.6% of males smoke cigars, whereas 2.1% of females smoke cigars. Use this additional information to find the probability that the selected subject is female.

a. P(Female) = ☐ (Type an integer or a decimal.)

b. P(Female|Cigar) = ☐ (Round to three decimal places as needed.)

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1. 0.9959
C
C

2. 0.756
the first choice

3. C

4. 0.295

5. B
0.999
the first choice

6. 120
D
$\frac{1}{120}$

7. 0.072
B

8. 0.1748
D

9. the first choice
0.6
0.4
0.2
0.4
0.6
0.2
0.4
0.4
0.8
0.6
the first choice

10. B

11. B

12. B

13. $\frac{1}{8}$
$\frac{3}{8}$
$\frac{1}{8}$

14. 475,020
$\frac{1}{475,020}$

15. 0.7025

16. 0.115
0.013225
0.986775
A

17. 0.570

18. $\frac{1}{33,649}$

19. 0.46
0.9999

20. 0.52
0.209