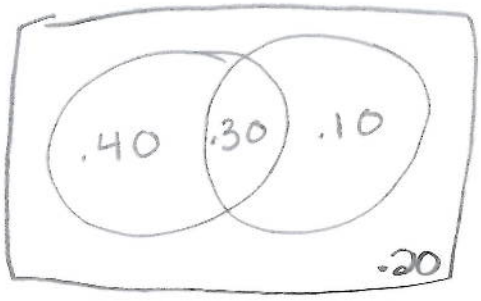
Key

Chapter 5 Test Review

Multiple Choice Questions

1. Among a group of boys, 70% like chocolate ice cream, 40% like strawberry ice cream, and 30% like both. If a boy is randomly selected from the group, what is the probability that he likes either chocolate or strawberry ice cream, but not both?

A) 10%
B) 20%
C) 30%
D) 50%
E) 80%



.40 + .10 = .50

2. Marketing managers at various department stores that are housed at malls are studying the types of people that might shop in their store. Their hopes are to make sure that they are catering to the clientele coming to their store. Vehicles parked within 200 feet of various "anchor" stores at a mall were categorized as shown in the table below as well as the type of store. The data were collected on a Saturday in May.

		Classification of Vehicle				
		Compact	Family/SUV	Luxury	Sport	Total
Store Class	Discount	130	198	12	32	372
	Mid-range	108	210	42	64	424
	High-end	64	178	53	73	368
	Total	302	586	107	169	1,164

If a vehicle is randomly selected, what is the probability that the vehicle is compact given that it is parked within 200 feet of a mid-range store?

P(compact | mid-range)

A) $\frac{108}{1164}$

B) $\frac{108}{302}$

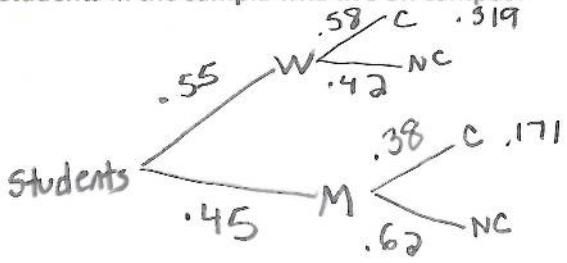
C) $\frac{108}{424}$

D) $\frac{302}{1164}$

E) $\frac{302}{368}$

3. There are 13,000 students at a certain university, 55% of whom are women. Of the women, 58% live on campus while only 38% of men do. If a random sample of 500 students is taken, what is the expected number of students in the sample who live on campus?

A) 190
B) 240
(C) 245
D) 290
E) 480



$.319 + .171 = .49$

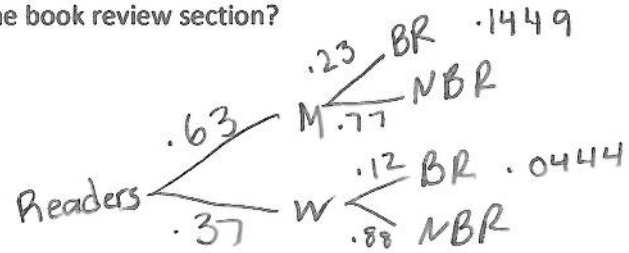
$.49(500) = 245$

4. Which of the pairs of events below are mutually exclusive when rolling a die once containing the numbers 1, 2, 3, 4, 5 and 6?

A) The probability of rolling a 5 and an odd number.
B) The probability of rolling a 4 and an even number.
C) The probability of rolling a number less than 4 and a multiple of 3.
(D) The probability of rolling a number greater than 5 and an odd number.
E) The probability of rolling a perfect square and a number that is not odd.

5. The Sunday edition of the newspaper has 585,320 readers. 63% of the readers are men. It is know that about 12% of the women and 23% of the men that read this newspaper will read the book review section. If a random sample of 200 readers is taken, what is the expected number of people that will read the book review section?

A) 23
B) 24
(C) 38
D) 46
E) 70



$.1449 + .0444 = .1893$

$.1893(200) = 37.86$

6. Alex, Bryan, and Charlie are all playing tennis matches in a tournament against different opponents. Based on previous performances, there is a 0.4 probability that Alex will win his first match, a 0.3 probability that Bryan will win his first match, and a 0.2 probability that Charlie will win his first match. If the chance that each wins his match is independent of the others, what is the probability that none of them wins in their first matches?

A) 0.024
B) 0.304
(C) 0.336
D) 0.700
E) 0.900

$1 - .4 = .6$

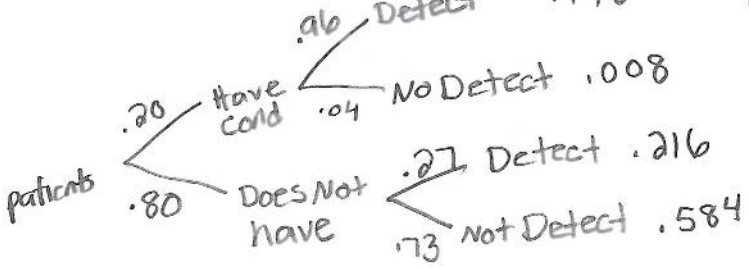
$1 - .3 = .7$

$1 - .2 = .8$

$.6(.7)(.8) = .336$

7. Doctors routinely used medical imaging for detecting certain physical conditions. One form of imaging detects a particular physical condition in 96% of male patients who have that condition. The scan also gives a negative result in 73% of patients who do not have the condition. The condition is present in about 20% of males. What is the probability that a randomly selected males who tests positive for the condition does not have it?

A) 0.0016
B) 0.0064
C) 0.0385
D) 0.4705
E) 0.5294



8. Suppose on any given day at school 0.15 of the English classes go to the computer lab, 0.10 of the Science classes go to the lab, and 0.04 of English and Science classes go to the lab. What is the probability on any given school day that either an English or Science class will go to the computer lab?

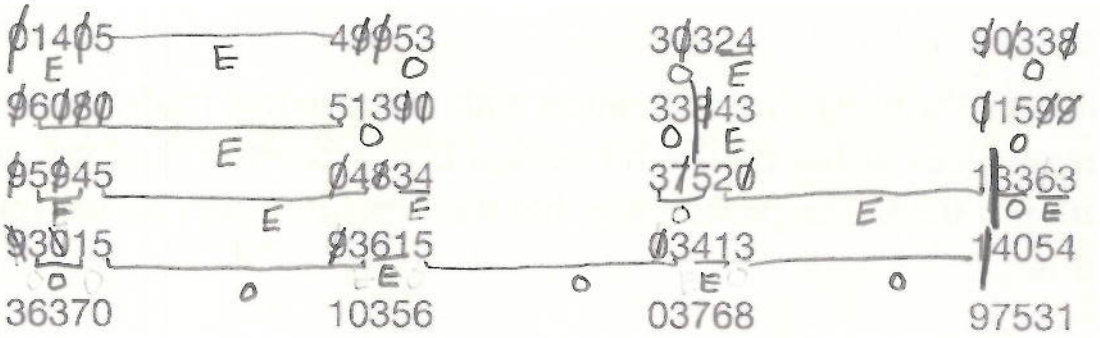
A) 0.15
B) 0.19
C) 0.21
D) 0.25
E) 0.29

$.15 + .10 - .04 = .21$

Free Response Questions

1. A game is played by two players named "A" and "B." In the game, each of the players rolls a fair die with faces numbered 1 through 6. If the product of the rolls is even, A scores a point. If the product of the rolls is odd, B scores a point. The rolls are repeated until one player has five points, in which case that player wins the game.

   Create a simulation to estimate the probability of Player A winning the game. Do three runs of your simulation to mke your estimate. Use the random digit table below to conuct the simulation.



* simulate the rolling of two dice, find the product of the rolls, and label it even or odd. Keep track of odds and evens until 5 of one or the other occurs, at which time a winner is established. Read single digits from the random digit table. Let the digits 1-6 represent a corresponding roll of 1-6 and ignore results of 7, 8, 9 or 0.
* One trial will consist of selecting two random digits, finding their product, and recording if the product is even or odd. This is repeated until either 5 even or 5 odd results have occurred.

Trial 1 - B wins 5-4
Trial 2 - A wins 5-2
Trial 3 - B wins 5-3

* Player A won one of the three games, so the estimated probability of A winning is 1/3.

2. The table below is a probability model for the number of cars in a randomly selected household in the United States.

Number of Cars	0	1	2	3	4	5
Probability	0.07	0.19	0.47	? .19	0.06	0.02

A) What is the probability that a randomly selected household has three cars? Show your work.

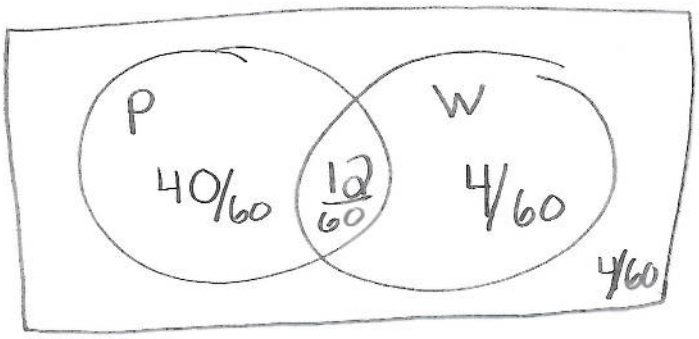
$1-(.07+.19+.47+.06+.02)=\boxed{.19}$

B) What is the probability that a randomly selected household has at least 2 cars? Show your work.

$.47+.19+.06+.02=\boxed{.74}$

3. Last Saturday at Mario's Pizza and Wings, 60 customers were served over the course of the evening. 52 customers ordered pizza and 16 ordered buffalo wings. 12 of these customers ordered both pizza and wings. Suppose we select a customer from last Saturday at random.

A) Create a Venn diagram below so that it describes the chance process involved here. Let P = the event "ordered pizza" and W = the event "ordered wings."



B) What is the probability that a randomly selected customer did not order wings or pizza? Justify your answer with appropriate calculations.

$1-(40/60+12/60+4/60)=\ 1-56/60=1/15=\boxed{.067}$

4. The table below gives the counts (in thousands) of earned degrees in the United States in a recent year, classified by level and by the gender of the degree recipient.

	Degree				
	Bachelor's	Master's	Professional	Doctoral	Total
Female	616	194	30	16	856
Male	529	171	44	26	770
Total	1145	365	74	42	1626

Suppose one degree recipient from this group is selected randomly.

A) List two mutually exclusive events for this chance process.

Female and Male, or any pair of degree types.

B) What is the probability that the person selected earned a Master's degree?

$P(\text{Masters}) = 365/1626 = \boxed{.224}$

C) What is the probability that the person selected earned a Professional or Doctoral Degree?

$P(\text{Masters or Doc}) = \frac{74+42}{1626} = \frac{116}{1626} = \boxed{.071}$

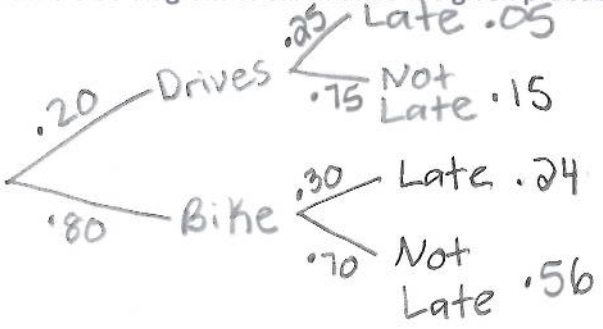
D) What is the probability that the person selected is female or earned a Master's degree?

$P(\text{Female and Mast}) = \frac{856}{1626} + \frac{365}{1626} - \frac{194}{1626} = \frac{1027}{1626} = \boxed{.632}$

5. Some days, Ramon drives to work. The rest of the time he rides his bike. Suppose we choose a random work day. The following table gives the probabilities of several events.

Event	Probability
Drives to work	0.20
Drives and is late for work	0.05
Late for work, given he bikes	0.30

A) Draw a tree diagram to summarize the given probabilities.



B) What is the probability that Ramon is late for work, given that he drives?

$P(\text{Late} \mid \text{Drives}) = \frac{.05}{.05+.15} = \frac{.05}{.20} = \boxed{.25}$

C) What is the probability that Ramon is not late for work, given than he drives?

$P(\text{Not Late} \mid \text{Drives}) = \frac{.15}{.05+.15} = \frac{.15}{.20} = \boxed{.75}$

6. What age groups use social networking sites? A recent study produces the following data about 768 individuals who were asked their age and which of three social networking sites they used most often.

Age Groups (Years)

Website	0-24	25-44	45-64	Over 65	Total
Facebook	77	105	114	12	308
Twitter	46	110	81	7	244
LinkedIn	15	97	95	9	216
Totals	138	312	290	28	768

Suppose one subject from this study was selected at random.

A) Find the probability that the selected subject preferred Twitter.

$P(\text{Twitter}) = \frac{244}{768} = .318$

B) Find the probability that the selected subject preferred Twitter, given that he or she was in the 45-64 age group.

$P(\text{Twitter} \mid 45\text{-}64) = \frac{81}{768} \Big/ \frac{290}{768} = \frac{81}{290} = \boxed{.279}$

C) Are the events "preferred Twitter" and "age group 45-64" independent? Explain.

No. Because $P(\text{Twitter} \mid 45\text{-}64) \neq P(\text{Twitter})$

$.279 \neq .318$

D) Are the events "preferred Twitter" and "age group 45-64" mutually exclusive? Explain.

No. The occurrence of one event does not preclude the occurrence of the other. It is possible that a subject preferred Twitter and is also in the 45-64 age group

E) If a random sample of two subjects were selected, what is the probability that neither preferred Twitter?

$768 - 244 = 524$

$\frac{524}{768} \cdot \frac{523}{767} = \boxed{.465}$

AP Statistics: Chapter 5 Quiz #2

Name: Key

Date _____ Period _____

1 Ivy conducted a taste test for four different brands of chocolate chip cookies. Below is a two-way table that describes which cookie each subject preferred and their gender.

Cookie Brand

	A	B	C	D	Totals
Female	4	6	13	13	36
Male	22	11	11	14	58
Totals	26	17	24	27	94

Suppose one subject from this experiment is selected at random.

A) Find the probability that the selected subject preferred Brand C.

$\frac{24}{94} = \frac{12}{47} = .2553$ or 25.53%

B) Find the probability that the selected preferred Brand C, given that she is female. $P(\text{Brand C} \mid F)$

$\frac{13}{36} = .3611$

$\frac{13}{94} \Big/ \frac{36}{94}$

$= \frac{13}{94} \cdot \frac{94}{36} = \frac{13}{36}$

C) Are the events "preferred Brand C" and "female" independent? Explain.

$P(\text{Brand C} \mid \text{female}) = P(\text{Brand C})$

$\frac{13}{36} \neq \frac{24}{96}$

$.2553 \neq .25$

No, because $P(\text{Brand C} \mid \text{female})$ does not equal $P(\text{Brand C})$

D) Are the events "preferred Brand C" and "female" mutually exclusive? Explain.

No. The occurrence of one event does not preclude the occurrence of the other. It's possible that a subject prefers Brand C and is also a female.

E) If a random sample of two subjects is selected, what is the probability that neither preferred Brand A?

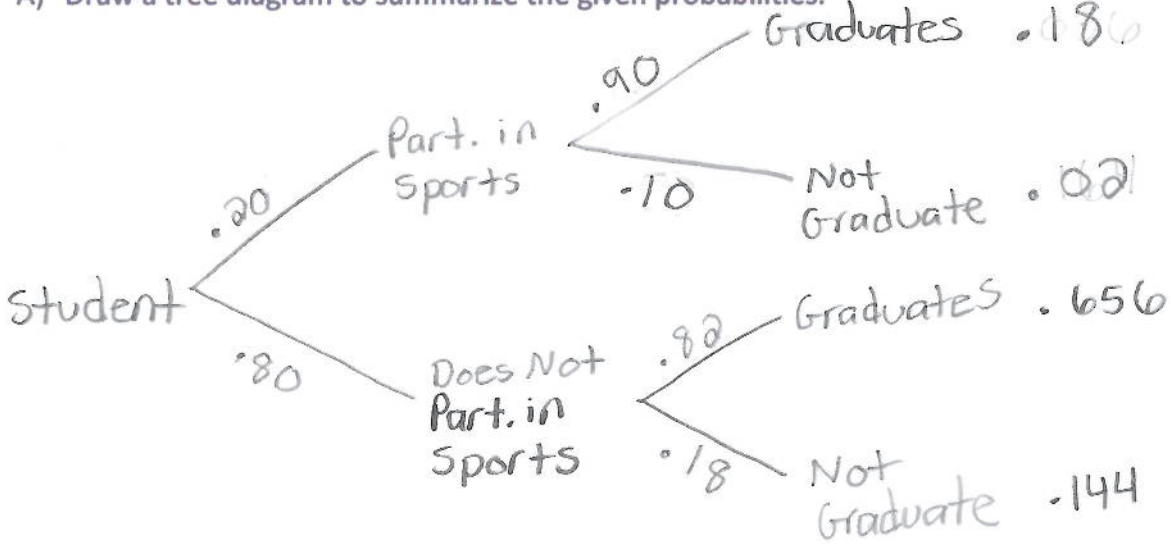
$\frac{68}{94} \cdot \frac{67}{93} = \frac{4556}{8742} = .5212$

52.12%

8. Officials at Lucky College are interested in the relationship between participation in sports and graduation rate. The following table summarizes the probabilities of several events when a male Lucky student is randomly selected.

Event	Probability
Student participates in sports	0.20
Student participates in sports and graduates	0.18
Student graduates, given no participation in sports	0.82

A) Draw a tree diagram to summarize the given probabilities.



B) Find the probability that a student graduates, given that he participates in sports.

$$P(\text{Stud Grads} \mid \text{Part Sports}) = \frac{.18}{.20} = .90 \text{ or } 90\%$$

C) Find the probability that the individual does not graduate, given that he participates in sports.

$$P(\text{No Grad} \mid \text{Part Sports}) = \frac{.02}{.20} = .10 \text{ or } 10\%$$

D) Find the probability that the individual does not participate in sports, given that he graduates.

$$P(\text{No Sports} \mid \text{Grads}) = \frac{.656}{.18 + .656} = \frac{.656}{.836} = .7847 \text{ or } 78.47\%$$