AP Statistics
Quiz Review 5.1 & 5.2

Name **Key**
Date_____ Hour_____

5.1 Practice

1. The probability of rolling two six-sided dice and having the sum on the two dice equal 7 is $\frac{1}{6}$.

(a) Interpret this probability.

If two dice were rolled many, many times, the proportion of rolls that resulted in the sum of the dice equaling 7 would be about $\frac{1}{6}$.

(b) You roll two dice six times. Are you guaranteed to get a sum of 7 once? Explain.

No. While we can predict the proportion of sum of 7's rolled in the long run, the proportion of sum of 7's in the short run is unpredictable.

2. To pass the time during a long drive, you and a friend are keeping track of the makes and models of cars that pass by in the other direction. At one point, you realize that among the last 20 cars, there hasn't been a single Ford. (Currently, about 16% of cars sold in America are Fords). Your friend says, "The law of averages says that the next car is almost certain to be a Ford." Explain to your friend what he doesn't understand about probability.

Assuming that the brand of each car is independent of other cars, the probability of the next car being a Ford does not change, regardless of what brands preceeded it. Only in the long run can we be sure that the # of Fords will approach whatever the expected prob. is.

3. A bag contains 10 equally-sized tags numbered 0 to 9. You reach in and, without looking, pick 3 tags without replacement. We want to use simulation to estimate the probability that the sum of the 3 numbers is at least 18. Describe the simulation procedure below, then use the random number table below to carry out 10 trials of you simulation and estimate the probability. Mark on or above each line of the table so that someone can clearly follow your method.

Random number table for question **3.** $P(\text{sum of } 3 \text{ #'s} \geq 18)$

	1	2	3	4	5	6	7	8	9	10	
128	15689		14277		06565	14374		13352		49367	81982	87209
129	36759		58984	68288		22913		18638		54303	00795	08727
130		69051		64817	87174		09517		84534		06489	87201	97245
131	05007		16632		81194		14873		04197	85576		45195	96565

Assign the digits 0 to 9 from the table to correspond to the numbers on the tags. Choose digits from the table until 3 digits, without repeats, are chosen. Add the 3 digits and determine if the sum is 18 or more. Do this 10 times and calculate the proportion of times that the sum is ≥ 18.

Trial 1: 1,5,6: sum 12
Trial 2: 8,9,1; sum 18
Trial 3: 4,2,7; sum 13
Trial 4: 9,4,5; sum 18
Trial 5: 6,5,1; sum 12

Trial 6: 4,3,7; sum 14
Trial 7: 4,1,3; sum 8
Trial 8: 3,5,2; sum 12
Trial 9: 4,9,3; sum 16
Trial 10: 6,7,8; sum 21

$P(\text{sum of } 3\text{#'s} \geq 18) = \frac{2}{10} = \frac{1}{5} = .2$

5.2 Practice

1. Suppose you choose a random U.S. resident over the age of 25. The table below is a probability model for the education level the selected person has attained, based on data from the American Community Survey from 2006-2008.

Education level attained	Probability
No high school diploma	0.20
High School diploma or GED	0.22
Some college	0.29
Bachelor's degree	0.19
Graduate or professional degree	?

$.20 + .22 + .29 + .19 = .9$

(a) What is the probability that a randomly selected person has a graduate or professional degree? (That is, fill in the space marked with a "?") Show your work.
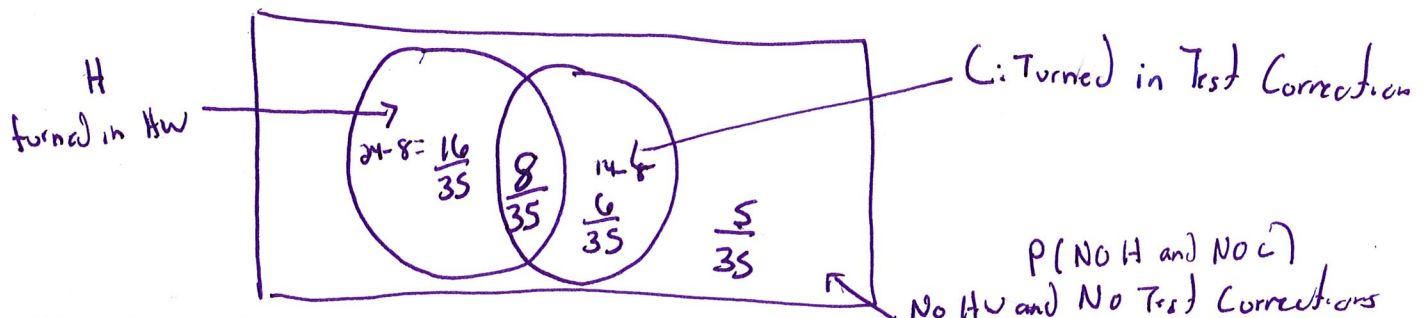
$P(\text{grad or prof degree}) = 1 - .9 = \boxed{.10 \text{ or } .1}$

(b) What is the probability that a randomly-selected person has at least a high school diploma? Show your work.

$P(\text{at least h.s. diploma}) = 1 - P(\text{no h.s. diploma})$
$= 1 - .20 = .80$

$\boxed{.80 \text{ or } .8}$

2. There are 35 students in Ms. Ortiz's Precalculus class. One day, 24 students turned in their homework and 14 turned in test corrections. Eight of these students turned in both homework and test corrections. Suppose we randomly select a student from the class.

(a) Fill in the Venn diagram below so that it describes the chance process involved here.
Let H = the event "turned in homework" and C = the event "turned in corrections."

H
turned in HW

$24 - 8 = \frac{16}{35}$ $\frac{8}{35}$ $14 - 8$ $\frac{6}{35}$ $\frac{5}{35}$

C: Turned in Test Correction

$P(\text{NO H and NO } \bar{C})$
No HW and No Test Corrections

(b) What is the probability that a randomly-chosen student turned in neither homework nor corrections? Justify you answer with appropriate calculations.

$P(\text{NO HW and NO Test Corrections}) = \frac{5}{35} = \frac{1}{7}$

Work: (easiest method)
$P(\text{No H and No } \bar{C}) = 1 - P(H \cup C)$
$= 1 - \frac{30}{35} = \frac{5}{35} = \frac{1}{7}$

or

$1 - P(H \cup C) = 1 - (P(H) + P(C) - P(H \cap C)) = 1 - \left(\frac{24}{35} + \frac{14}{35} - \frac{8}{35}\right) = 1 - \frac{30}{35} = \frac{5}{35} = \frac{1}{7}$

or

$1 - P(H \cup C) = 1 - \left(\frac{16}{35} + \frac{8}{35} + \frac{6}{35}\right) = 1 - \frac{30}{35} = \frac{5}{35} = \frac{1}{7}$

3. Below is a two-way table that describes responses of 120 subjects to a survey in which they were asked, "Do you exercise for at least 30 minutes four or more times per week?" and "What kind of vehicle do you drive?"

		Car type			
		Sedan	SUV	Truck	Total
Exercise?	Yes	25	15	12	52
	No	20	24	24	68
	Total	45	39	36	120

Suppose one person from this sample is randomly selected.

(a) List two mutually exclusive events for this chance process.

Two M.E. events are exercising (Yes) and not exercising (No)

Two ME events are driving any pair of car types (such as Sedan and SUV)

(b) What is the probability that the person selected drives an SUV?

$P(\text{drives SUV}) = \frac{39}{120} = \frac{13}{40} = 0.325$

(c) What is the probability that the person selected drives either a sedan or a truck?

M.E.

$P(\text{sedan or truck}) = P(\text{sedan}) + P(\text{truck}) = \frac{45}{120} + \frac{36}{120} = \frac{81}{120} = \frac{27}{40} = .675$

(d) What is the probability that the person selected drives a truck or exercises four or more times per week?

$P(\text{truck or exercises}) = P(\text{truck}) + P(\text{exercise}) - P(\text{truck and exercise})$

not ME

$= \frac{36}{120} + \frac{52}{120} - \frac{12}{120} = \frac{76}{120} = \frac{19}{30} \approx .63$.