Math 1711   **Exam 2**   Spring 2014

Instructor: Sal Barone (A)

Name: _____KEY_____

GT username: _____

Circle your TA/section: (D1) Ashley   (D2) Kayla   (D3) Alyssa   (D4) Aileen

1. No books or notes are allowed.

2. You may use ONLY NON-GRAPHING and NON-PROGRAMABLE scientific calculators. All other electronic devices are not allowed.

3. Show all work to receive full credit.

4. Write your answers in the box provided.

5. Good luck!

Page	Max. Possible	Points
1	32	
2	22	
3	26	
4	20	
Total	100	

1. Two fair die are rolled and the numbers facing upwards are recorded. What is the probability that the numbers add up to 8? *Show your work.* (8 pts.)

6,2
5,3
4,4
3,5
2,6

$$\frac{5}{6^2} = \frac{5}{36} \approx \boxed{13.9\%}$$

2. There are 4487 words in the U.S. Constitution. The word "shall" occurs 191 times and the word "States" appears 81 times. What is the probability that a word randomly chosen from the constitution is neither "shall" nor "States"? (14 pts.)

$$Pr(\text{shall or States}) = \frac{191+81}{4487} = \frac{272}{4487} \approx 6.1\%$$

Pr (not shall and not states) $\approx 1 - .061 = \boxed{93.9\%}$

3. Let E and F be two possible events in an experiment. If $Pr(E) = .6$, $Pr(F) = .4$ and $Pr(E \cap F') = .5$, then find $Pr(E' \cap F)$. (10 pts.)

E   F

.5   (.1) .3

$$Pr(E' \cap F) = .3$$

1
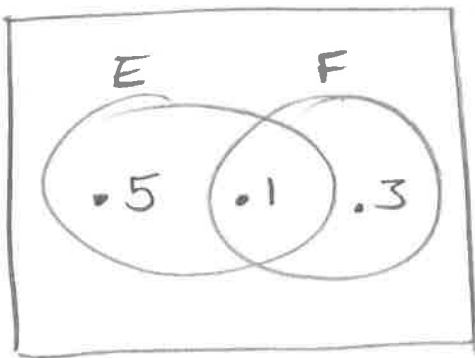
4. Let S be a sample space and E and F be events from the sample space. Suppose that $Pr(E) = .5$, $Pr(F) = .6$ and $Pr(E \cap F) = .2$. What is $Pr(E|F)$?   (10 pts.)

$$Pr(E|F) = \frac{Pr(E \text{ and } F)}{Pr(F)} = \frac{.2}{.6} \approx \boxed{33\%}$$

5. An urn contains 6 white balls and 3 green balls. A ball is selected at random and placed on a table, then another ball is selected and placed next to the first ball.
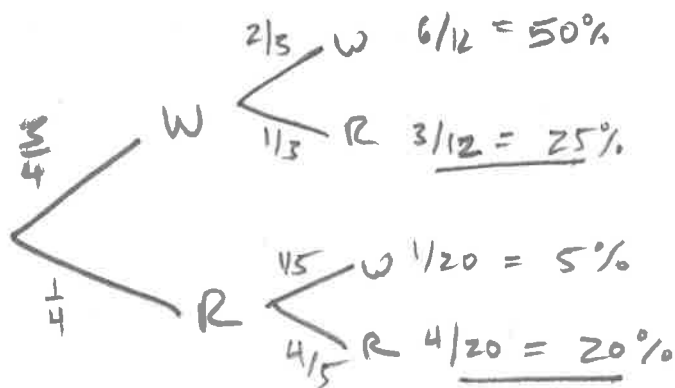
(6 pts. each)

(a) What is the probability that both balls are green?

$$Pr(\text{both green}) = \frac{\binom{3}{2}}{\binom{9}{2}} = \frac{3}{36} = \frac{1}{12} \approx \boxed{8.3\%}$$

(b) What is the probability that both balls are green if the first ball selected was green?

$$Pr(\text{both green} \mid \text{first green}) = \frac{Pr(\text{both green})}{Pr(\text{first green})} = \frac{1/12}{3/9}$$

$$= \boxed{25\%}$$

6. There are two urns: a **white urn** containing three white balls and a red ball and a **red urn** containing one white ball and four red balls. An experiment consists of selecting a ball at random from the **white urn** and then (without replacement) selecting a ball at random from the **urn with the same color** as the first ball selected. What is the probability that the second ball selected is red? (16 pts.)

$$\frac{3}{4} \diagdown W \diagup^{\ 2/5}\ W \quad 6/12 = 50\%$$
$$\qquad\qquad \searrow_{1/3}\ R \quad 3/12 = \underline{25\%}$$

$$\frac{1}{4} \searrow R \diagup^{\ 1/5}\ W \quad 1/20 = 5\%$$
$$\qquad\qquad \searrow_{4/5}\ R \quad 4/20 = \underline{20\%}$$

$$20\% + 25\% = \boxed{45\%}$$

7. A fair die is rolled seven times and the numbers facing upwards are recorded. What is the probability of rolling exactly four 3's? (10 pts.)

$$\frac{\binom{7}{4} * 5^3}{6^7} = \frac{4375}{279936} \approx \boxed{1.6\%}$$

3

8. If E and F are independent events of a sample space S and $Pr(E) = .5$ and $Pr(F) = .3$, then what is $Pr(E|F)$?   (8 pts.)

$$Pr(E|F) = Pr(E) \quad \text{if} \quad E \text{ 4 } F \text{ are independent.}$$

$$\text{so} \quad \boxed{Pr(E|F) = .5}$$

9. True or False questions.   (4 pts. each).

(a) A red die and a green die are rolled. Let the event E be "the sum of the numbers showing is 7" and let F be the event "the red die is a 6".

(i) The events E and F are independent.   TRUE   FALSE

(ii) The events E and F are not mutually exclusive.   TRUE   FALSE

(b) If s is an outcome of a sample space S and $Pr(s) = .4$,   TRUE   FALSE
then the odds of s occurring are 2 to 5.

4