

Instructor: Sal Barone (B)

Name: KEY

GT username: _____

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

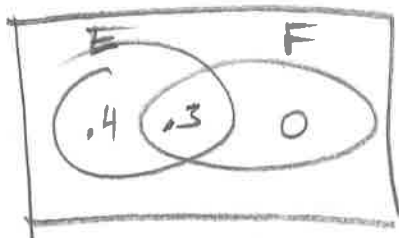
1. No books or notes are allowed.
2. You may use ONLY NON-GRAPHING and NON-PROGRAMABLE scientific calculators. All other electronic devices are not allowed.
3. Show all work to receive full credit.
4. Write your answers in the box provided.
5. Good luck!

Page	Max. Possible	Points
1	34	
2	26	
3	20	
4	20	
Total	100	

1. A fair die is rolled seven times and the numbers facing upwards are recorded. What is the probability of rolling exactly four 5's? (10 pts.)

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

2. Let E and F be two possible events in an experiment. If $Pr(E) = .7$, $Pr(F) = .3$ and $Pr(E \cap F) = .4$, then find $Pr(E' \cap F)$. (10 pts.)



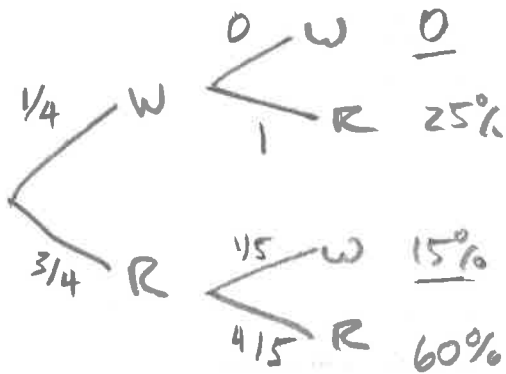
$$\boxed{Pr(E' \cap F) = 0}$$

3. There are 4287 words in the U.S. Constitution. The word "shall" occurs 181 times and the word "States" appears 86 times. What is the probability that a word randomly chosen from the constitution is neither "shall" nor "States"? (14 pts.)

$$Pr(\text{shall or states}) = \frac{181+86}{4287} = \frac{267}{4287} \approx 6.2\%$$

$$Pr(\text{not shall and not states}) \approx 1 - 0.062 = \boxed{93.8\%}$$

4. There are two urns: a **white urn** containing a white ball and three red balls 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 white? (16 pts.)



15%

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

$$Pr(E|F) = \frac{Pr(E \text{ and } F)}{Pr(F)} = \frac{.2}{.5} = \underline{\underline{40\%}}$$

6. If E and F are independent events of a sample space S and $Pr(E) = .3$ and $Pr(F) = .4$, then what is $Pr(E|F)$? (8 pts.)

$Pr(E|F) = Pr(E)$ if E & F are independent

so $Pr(E|F) = .3$

7. 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 mutually exclusive.

TRUE

FALSE

(ii) The events E and F are not independent.

TRUE

FALSE

- (b) If s is an outcome of a sample space S and $Pr(s) = .4$, then the odds of s occurring are 2 to 3.

TRUE

FALSE

8. Two fair die are rolled and the numbers facing upwards are recorded. What is the probability that the numbers add up to 6? *Show your work.* (8 pts.)

1,5
2,5
3,3
4,2
5,1

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

9. An urn contains 7 white balls and 3 red 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 red?

$$Pr(\text{both red}) = \frac{\binom{3}{2}}{\binom{10}{2}} = \frac{3}{45} \approx \boxed{6.7\%}$$

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

$$Pr(\text{both red} \mid \text{first red}) = \frac{Pr(\text{both red})}{Pr(\text{first red})} = \frac{1/15}{3/10}$$

$$= \frac{10}{45} \approx \boxed{22.2\%}$$