Name:	Group

Write down if each of the following situations are disjoint or not.
A: The red die is 2 B: The white die is 3 C: The sum of the two dice is 3
D: The sum of the two dice is 2

a) A and B

b) A and C

c) A and D

d) B and C

e) A, B, and C

f) B, C, and D

2. The sample space for the rolling of a hypothetical 5-sided die is  $S = \{1, 2, 3, 4, 5\}$ . The following table provides three different potential probability assignments to the possible outcomes.

Outcome	#1	#2	#3
1	0.5	0.10	0.1
2	0.2	0.15	0.1
3	0.5	0.20	0.1
4	-0.5	0.25	0.1
5	0.3	0.30	0.1

a) Which of the assignments #1 - #3 are legitimate? Explain.

b) Determine the probability that the die comes up odd by using each of the legitimate probability assignments in the table.

3. a) What is the probability that I don't roll a 20 on a 20-sided die?

b) When a 4-sided die is rolled, let A be the event that a 1 is rolled and B be the event that an odd number is rolled.

i) Without doing any calculations, explain why  $P(A) \le P(B)$ 

ii) Do the calculations.

4. In a kindergarten class, there are 30 students. Altogether, 19 of them like lollipops, and 10 of them like licorice (some like both). There are 8 students who don't like either of these. A child is chosen at random. What is the probability that the child likes both lollipops and licorice?

5. a) Prove  $P(B) = P(B \cap A) + P(B \cap A^{c})$ . You may not use any theorems, only axioms.

b) Prove P(A U B) = P(A) + P(B  $\cap$  A<sup>c</sup>). You may use axioms, part a) and Th. 2.22.

6. There are 89 students in a volunteer group for majors in math, statistics, or actuarial science. Thirteen students have a double-major in math and statistics. Twelve students have a double major in math and actuarial science. Thirteen students have a double major in statistics and actuarial science. There are 9 students doing a triple major. Thirty-nine students are majoring in at least statistics, and forty-four are majoring in at least actuarial science. How many students are majoring in at least mathematics?

7. I am out rock climbing, and the rock face has 4 easy, 7 challenging, and 3 extreme routes to get to the top. The routes are poorly marked, so I just choose one at random, with all routes equally-likely. What is the probability that I do not choose an extreme route?

8. For the following situations, identify whether the type of probability is equally-likely, empirical or subjective. Please explain your answer.

a) The percentage of male students in STAT 311 in Spring 2016 is 75%

b) The percentage of male students in STAT 311 in Spring 2017 will be more than 50%.

c) In 2013, 65.9% of all high school graduates were enrolled in colleges or universities.

9. Use the frequentist interpretation of probability to interpret each statement.

a) The probability was 0.127 that a flight departure was delayed at Indianapolis International Airport in 2015.

b) The probability is 0.158 that the Wild Card Team wins the Super Bowl.