

## MATH 191 PROBLEM SET 1: Events and probabilities

Due on Thursday Sep.20-th

1. A fair dice, when thrown, has an equal chance of falling on any of the numbers 1,2,3,4,5,6. In case of two dice the sum of the numbers thrown is between 2 and 12. Both 9 and 10 can be made up in two different ways  $9=3+6=4+5$  and  $10=4+6=5+5$ . Is it true that 10 comes as often as 9 when we throw two dice? Analyze also the case when you throw 3 dice.

2. A paradox. In four throws of a single dice the probability that we get at least one ace [=1] is more than  $1/2$  [Please find this probability !!]. Therefore the probability of getting a double ace [ that is two aces in a row] at least ones is 6 times less. So the probability of getting a double ace at least ones in 24 throws should also be more than  $1/2$ . On the other hand direct computations show that this probability is actually less than  $1/2$ . [Please find this probability !!]. How would you explain the "paradox" ?

Remark. The problem 2 is tricky

3. Peter and Robert are playing a fair game [ that is both have the same chances of winning]. and have agreed that whoever wins 6 rounds first gets the whole prize. They had to stop when Peter won 5 and Robert 3 rounds. How should the prize be divided fairly?

Chapter 1.

Section 1.2 Problems 1,2,3,5

Section 1.3 Problems 1,2,3,4