## ECE 341 - Homework #1 Solution

Tree Diagrams and Enumeration.

1) Two teams, A and B, are playing a best of 5 game series. (The series is over once one team wins 3 games). The probability of A winning any given game is 0.6. Draw the tree diagram for all possible outcomes of the series.



2) List all possible combinations of rolling a 4-sided die (d4) and a 6-sided die (d6) (enumaration).

## There are 24 possible combinations

(1, 1)	(1,2)	(1,3)	(1, 4)	(1,5)	(1,6)
(2, 1)	(2,2)	(2,3)	(2,4)	(2,5)	(2,6)
(3,1)	(3,2)	(3,3)	(3,4)	(3,5)	(3,6)
(4,1)	(4,2)	(4,3)	(4,4)	(4,5)	(4,6)

Also determine the probability X {1..6} where X is the largest of the two numbers.

Х 1: (1,1) 2: (1,2) (2, 1)(2, 2)3: (1,3) (2, 3)(3,3) (3,1) (3,3) (2,4) 4: (1,4) (2,4) (4, 4)(4,3) (4,2) (4, 1)(2,5) (3,5) (4,5) 5: (1,5) 6: (1,6) (2,6) (3,6) (4,6)

## The odds are then

1: 1/24 2: 3/24 3: 5/24 4: 7/24 5: 4/24 6: 4/24

Two players, A and B, are playing a game of dice.

- Player A rolls a d4 and a d6 and takes the largest of the two numbers (i.e. problem #2)
- Player B rolls a 6-sided die and adds one to the total.

Player A wins on ties.

3) What is the conditional probability

- Player A wins given B's score is 3 (B rolled a 2)
- 1: 1/24
- 2: 3/24 3: 5/24 4: 7/24
- 5: 4/24
- 6: 4/24

There are 20 ways A can roll 2 or higher.

## The probability that A wins is 20/24

4) What is the probability that player A will win any given game?

Use conditional probabilities

B's Roll	2	3	4	5	6	7
p(B)	1/6	1/6	1/6	1/6	1/6	1/6
p(A   B)	23/24	20/24	15/24	8/24	4/24	0
p(A B)p(B)	23/144	20/144	15/144	8/144	4/144	0/144

The total is then 70 / 144 = 0.486

A has a 48.6% chance of winning any given game (meaning bet on B)