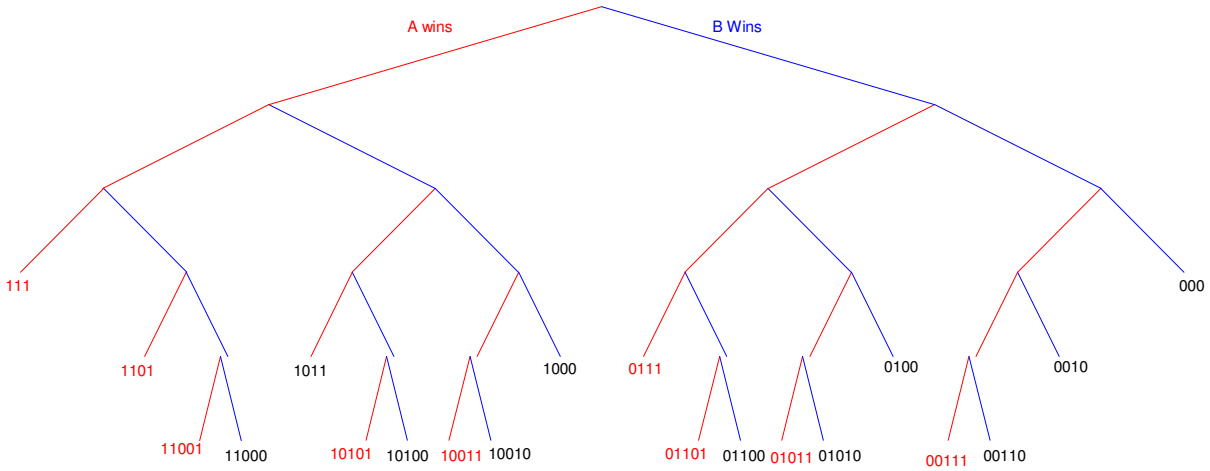
ECE 341 - Homework #1 Solution

Tree Diagrams and Enumeration. Due Wednesday, May 20th

Please make the subject "ECE 341 HW#1" if submitting homework electronically to Jacob_Glower@yahoo.com (or on blackboard)

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

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(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.

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X
1: (1,1)
2: (1,2)  (2,1)  (2,2)
3: (1,3)  (2,3)  (3,3)  (3,1)  (3,3)
4: (1,4)  (2,4)  (2,4)  (4,4)  (4,3)  (4,2)  (4,1)
5: (1,5)  (2,5)  (3,5)  (4,5)
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)