

## Practice for L3 Probability #5

### Question One

There are two bags containing balls identical except in their colour.

The first has 5 green and 3 red balls. The second has 2 green and 3 red balls.

Complete the table below for the probability distribution of the red balls drawn.

g	0	1	2
$P(G = g)$			

### Question 2

For two events, A and B, the following is known:  $P(A | B) = 0.75$  and  $P(A \cap B) = 0.6$

Find  $P(B')$

### Question 3

Each day, Carolyn has both Statistics and Calculus homework.

The probability that she doesn't finish her Statistics homework is 0.15.

The probability that she doesn't finish her Calculus homework is 0.2.

The probability that she doesn't finish either her Statistics or her Calculus homework is 0.035.

(a) Are the events 'Statistics homework not finished' and 'Calculus homework not finished' independent? *Justify your answer.*

(b) Find the probability that Carolyn finishes both her Statistics and Calculus homework.

(c) Find the probability that, given Carolyn doesn't complete her statistics homework, she doesn't finish her Calculus homework also.

### Question Four

Wendy is playing a game of chance at the school gala, costing \$1 for each game.

In the game, two fair tetrahedral dice (i.e. 4-sided, marked 1, 2, 3 and 4) are rolled and the difference of the numbers that turn up is found.

If the difference is zero, then Wendy wins \$5. Otherwise Wendy loses her money.

Wendy plays the game 20 times. Find her expected profit or loss.

## Answers: Practice for L3 Probability #5

1. A tree might help to follow the probabilities.

g	0	1	2
P(G = g)	$\frac{3}{8} \times \frac{3}{5}$ = 0.225	$\frac{3}{8} \times \frac{2}{5}$ + $\frac{5}{8} \times \frac{3}{5}$ = 0.525	$\frac{5}{8} \times \frac{2}{5}$ = 0.25

2. Formula sheet gives  $P(A | B) = \frac{P(A \cap B)}{P(B)}$

$$\text{so } 0.75 = \frac{0.6}{P(B)} \text{ so } P(B) = 0.6 \div 0.75 = 0.8$$

$$\text{So } P(B') = 1 - 0.8 = 0.2$$

- 3.

	Stats done	Stats not done	
Calc done	0.685	0.115	0.8
Calc not done	0.165	0.035	0.2
	0.85	0.15	1

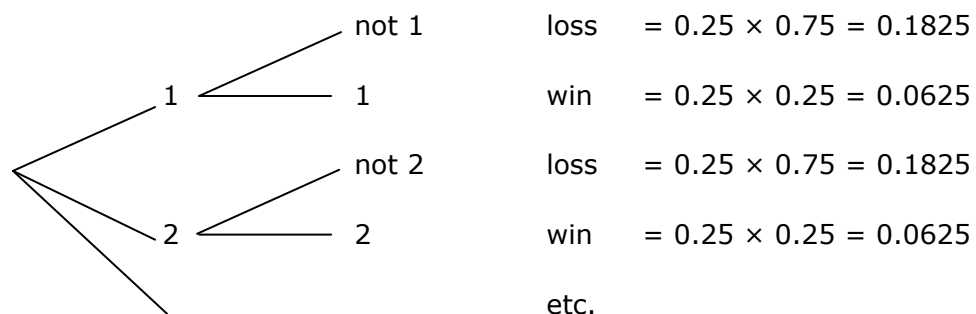
a)  $P(S') \cdot P(C') = 0.15 \times 0.2 = 0.03 \neq P(S' \cap C') = 0.03$  so **not** independent

b) 0.0685 from table

(or  $P(S \cup C) = P(S) + P(C) - P(S \cap C)$  so  $0.8 + 0.85 - x = 1 - 0.035$ )

c)  $P(C' | S') = \frac{P(C' \cap S')}{P(S')} = \frac{0.035}{0.15} = 0.2333$

- 4.



x	0	Not zero
P(X=x)	$4 \times 0.0625$ = 0.25	$4 \times 0.1825$ = 0.75
weight	+5 - 1 = +4	-1

$$E(x) = 0.25 \times +4 + 0.75 \times -1 = 0.25$$

Over twenty games she would expect to win  $20 \times 0.25 = \$5$