**ST3009 – Statistics**

**2017 Exam Solutions**

**Question 1**

a)

i)

Probability of red = 0.5

Probability of black = 0.5

ii)

There are ways of drawing 5 balls from 10.

There are ways of drawing 2 red balls from 5.

There are ways of drawing 3 black balls from 5.

Therefore, the probability is:

iii) 4 floors

3 guests

P(floorX) = 0.25

First guest has 4 floors to choose from, second has 3, third has 2.

Total combinations = 4 \* 3 \* 2 = 24

There are 4^3 ways of 3 guests choosing from 4 floors, therefore probability is:

**Question 2**

i)

**Random Event:** A random event is a subset of the sample space. Consider the tossing of two coins. The event {H, H} is a random event which is a subset of the sample space.

**Random Variable:** A random variable maps a random event to a real number. Consider the tossing of a six-sided die. Let the random variable X denote the number tossed by the die. X can take the values [1,6].

ii)

iii)

iv) Two random variables X and Y are independent iff:

Holds for all values of x and y that variables X and Y can take.

v) X and Y can take values {1, 2, 3}

P(X/Y = 1/2/3) = p

V = XY

To verify they are dependent consider the example P(V=1 and X=2).

P(V=1) = P(X=1 and Y=1) = (1/3)(1/3) = 1/9

P(X=2) = 1/3

P(V=1 and X=2) = 0 since there is no value of Y for which V=XY=1 when X=2. Therefore V and X are not independent.