**ST3009 - Statistical Methods for Computer Science**

**Week 2 Questions**

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***Question 1 –*** *A 6-sided die is rolled three times*

1. The sample space S is the set of all possible outcomes of an experiment. If the dice was to be rolled just once S would have 6 elements (rolls 1 through 6). However, since the die is rolled three times the sample space S becomes all possible outcomes of the three experiments:
2. An event E is a subset of the sample space S. Consider the events E1, E2, E3 as the events that 1 two is rolled, 2 two’s are rolled and 3 two’s are rolled. The number of elements in each event is:

For E1 the total number of outcomes is calculated using 3 choose 1 (since you want 1 of the three rolls to produce a 2) and then by the product rule you multiply this by the remaining numbers for each of the remaining two rolls (5 \* 5). The same is applied for E2 and E3 taking in to account the reduction in subsequent rolls.

These are summed to produce E, the event that a 2 is rolled at least once in the three rolls.

Using this we can calculate the probability that E occurs using the rule: