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| **School of Mathematical Sciences**  **Assignment Cover Sheet**  **MATHS: Probability and Statistics** |  | MARK: |

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| **Tick the box corresponding to the assignment number** | | | | |
| 1 | 2 | 3 | 4 | 5 |

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| StudentLast Name | Martin |
| Student First Name | Andrew |
| Student ID | 1704466 |
| Tutorial Day and Time | Tuesday 2pm |

**WARNING**

Remember to sign the plagiarism declaration at the bottom of the page. *If this is not signed, a mark of 0 will be recorded for this assignment.*

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**Plagiarism:** using another person’s ideas, designs, words or works without appropriate acknowledgement.

**Collusion:** another person assisting in the production of an assessment submission without the express requirement, or consent or knowledge of the assessor.

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Probability and Statistics

2.a   
Permutations with repeated entries has form Where entries 1-> n are repeated cases (eg entries 1 is red cups so its value would be 2)

2.b  
fixed order of the saucers – so red, red, blue, blue, stars, stars (from left to right)  
Note. Red = R, Blue= B and Stars = S

Where are separated purely to show that there are two of each Colour (C).

If the first two are both blue, then the last two must both be red (meaning that there is only one combination for the rest of the colours (i.e. it would be B B S S R R).   
The same holds if they are both stars.

If the combination of the first two is B then S, then there are four possible outcomes for the following cups: (B S S R R B), (B S R S R B), (B S R S B R) and (B S S R B R).  
Likewise the solutions given that the first is S and the second B will be: (S B S R R B), (S B R S R B), (S B R S B R) and (S B S R B R).  
So in total there are solutions.

2.c   
The initial step of placing the saucers does not affect the solution, so given any ordering of the saucers there are possible ways to place the cups on the saucers (From 2.a)  
There are 10 solutions which are acceptable (From 2.b)

3.a

3.b

Independence requires   
But as ALL of A is strictly in B   
is the only solution (where B is the sample space)   
 Dependent

4.a  
IF then   
The events are independent as all rolls themselves are completely independent (rolling a die) and i , j , m and n are all different rolls. As well as this, the intervals and are disjoint.

4.b

If this implies that the reading for starts as soon as ends, i.e. the die is rolled until it lands on the same number again.   
For and to be independent,   
(as there are 6 possibilities)  
 for the same reasons

If j = m, this is the same as asking if you get the same number 3 times

4.c

From 4.b and are independent,   
I.e.

But as   
so   
Which implies they are not independent as the result would have required: