Mathematics for Software Development

BSc (Hons) Computer Games Programming

School of Engineering, Arts, Science and Technology

Answer all of the following questions, showing all of your working. Use extra sheets of paper if required (graph or squared paper may be used).

Hand out on Monday 21st October 2019

**To be completed by 09:00 Monday 28th October 2019**

Student ID …………………………………..

This problem set has 8 questions, for a total of 100 points.

**ASSESSMENT**

The majority of the summative assessment takes the form of regular problem sets assigned to students to be completed within a reasonable time frame, formative feedback will be available to them during tutorial sessions and workshops.

These problem sets will reinforce topics discussed in lectures and lead into a final exam of three hours, requiring students to answer a series of questions and provide their workings to demonstrate their understanding of the concepts underlying the questions being asked of them.

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| **Component Number** | **Form of assessment** | **Assessment size** | **Weighting (%)** | **Learning Outcomes assessed** |
| 1 | Problem Sets | 8 sets | 80% | 1, 2, 3 |
| 2 | Exam | 3 hours | 20% | 1, 2, 3 |

**ASSESSMENT CRITERIA**

1. Attempted to solve mathematical problems, making use of the correct underlying theories.
2. Submitted a series of solutions to assigned problem sets.
3. Produced solutions to problems, explaining their workings for each problem clearly and concisely.

This problem set has 8 questions, for a total of 100 points.

Marks Awarded:

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| **Question** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **Total** |
| **Marks Available** | **10** | **14** | **12** | **12** | **10** | **15** | **15** | **12** | **100** |
| **Score** |  |  |  |  |  |  |  |  |  |

Question 1

Two fair spinners each have four faces numbered 1 to 4. The two spinners are thrown together and the sum of the numbers indicated on each spinner is recorded. Calculate the following, answer in the space provided. [2 points each part]

(Hint: See diagram on PowerPoint slide 7.)

1. The sum is exactly 8.

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1. The sum is exactly 5.

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1. The sum is greater than 5.

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1. The sum is less than 5.

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1. The sum is an even number.

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Points awarded: \_\_\_\_\_\_\_\_\_ out of a possible 10.

Question 2

A card is chosen at random from a pack of 52 playing cards. Let be the event ‘the card is a diamond’ and is the event ‘the card chosen is a King’. Calculate the following, answer in the space provided. [2 points each part]



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Points awarded: \_\_\_\_\_\_\_\_\_ out of a possible 14.

Question 3

and are two events and , and Calculate the following, answer in the space provided. [2 points each part]



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Points awarded: \_\_\_\_\_\_\_\_\_ out of a possible 12.

Question 4

and are two events with , and Calculate the following, answer in the space provided. [2 points each part]



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Points awarded: \_\_\_\_\_\_\_\_\_ out of a possible 12.

Question 5

A Red die has six faces but only two values as follows: 3 3 3 3 3 6. An Olive coloured die has six faces but only two values as follows: 1 4 4 4 4 4. Each die is rolled once and the highest value wins. Answer the following in the space provided.

1. Draw a tree diagram or table to represent the information [4 points]

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Find the probability that:

1. The Olive die showed the highest value. [3 points]

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1. The Red die showed the highest value. [3 points]

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Points awarded: \_\_\_\_\_\_\_\_\_ out of a possible 10.

Question 6

and are two independent events such that and . Evaluate the following probabilities. [3 points each part]



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Points awarded: \_\_\_\_\_\_\_\_\_ out of a possible 15.

Question 7

A group of 50 students was asked which social media apps they used; A, B or C. The results showed that 25 used app A, 16 used app B, 14 app C, 5 both A and B, 4 both B and C, 6 both C and A, and 2 used all three apps.

1. Draw a Venn diagram to represent the information [8 points]

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A student is selected at random. Find the probability that they use

1. At least one of the apps. [3 points]

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1. Only one of the apps. [4 points]

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Points awarded: \_\_\_\_\_\_\_\_\_ out of a possible 15.

Question 8

Two students try to invent a new dice game. Each player has a fair die with the values 1 2 3 4 5 6. Their first idea is that the players take turns to roll their die, and to win the second player must score more than the first. Otherwise the first player wins. Find the probability that the second player wins. [6 points]

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|  |  | Second Player | | | | | |
|  |  | 1 | 2 | 3 | 4 | 5 | 6 |
|  | 1 |  |  |  |  |  |  |
| First | 2 |  |  |  |  |  |  |
| Player | 3 |  |  |  |  |  |  |
|  | 4 |  |  |  |  |  |  |
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Their next idea is that the second play must reroll a score of 1 until they get a higher value. Find the probability that the second player wins. [6 points]

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|  |  | Second Player | | | | | |
|  |  | 1 | 2 | 3 | 4 | 5 | 6 |
|  | 1 |  |  |  |  |  |  |
| First | 2 |  |  |  |  |  |  |
| Player | 3 |  |  |  |  |  |  |
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Points awarded: \_\_\_\_\_\_\_\_\_ out of a possible 12.