|  |  |  |
| --- | --- | --- |
| C:\Users\David\Dropbox\rossmoyne.png**Reading Time**: An initial **2 minutes** to view **BOTH** sections | **MATHEMATICS METHODS : UNITS 3 & 4, 2022** Test 3 – (10%)3.3.1 to 3.3.16, 4.1.1 to 4.1.3, 4.1.5, 4.1.7  |  |
| **Time Allowed**21 minutes | **First Name Surname**  | **Marks**24 marks  |

**Circle your Teacher’s Name:** Mrs Alvaro Mrs Bestall Mrs Fraser-Jones Mr Gibbon/Luzuk Mrs Greenaway Mr Koulianos Mr Luzuk Mrs Murray Mr Tanday

|  |  |
| --- | --- |
| **Assessment Conditions: *(N.B. Sufficient working out must be shown to gain full marks)***

|  |
| --- |
| * Calculators: Not Allowed
* Formula Sheet: Provided
* Notes: Not Allowed
 |

 |

**PART A – CALCULATOR FREE**

Question 1 [1,2 - 3 marks]

Given that  and  , express the following in terms of  and/or 

1. 

1. 

Question 2 [1,2,2 - 5 marks]

Simplify each of the following expressions, expressing your answer in the form of a single

logarithm, ****

1. 
2. 
3. ****

Question 3 [1, 3, 2 - 6 marks]

For a certain population, the probability of a person being born with a specific gene SPGE1 is 

The probability of a person having this gene is independent of any other person in the population

having this gene.

In a randomly selected group of 3 people, determine the probability that;

1. none out of the three have the gene.
2. less than two have the gene
3. none have the gene, given that less than two have the gene.

Question 4 [1,4,3 - 8 marks]

Solve for **** , leaving answers as **exact** values

1. ****
2. ****
3. 

Question 5 [ 2 marks]

The random variable *X* has the following probability distribution, where 



If  , show that 

 **End of section**

**Spare page :**

|  |  |  |
| --- | --- | --- |
| C:\Users\David\Dropbox\rossmoyne.png**Reading Time**: An initial **2 minutes** to view **BOTH** sections | **MATHEMATICS METHODS : UNITS 3 & 4, 2022** Test 3 – (10%)3.3.1 to 3.3.16, 4.1.1 to 4.1.3, 4.1.5 , 4.1.7 |  |
| **Time Allowed**27 minutes | **First Name Surname**  | **Marks**31 marks  |

**Circle your Teacher’s Name:** Mrs Alvaro Mrs Bestall Mrs Fraser-Jones Mr Gibbon/Luzuk Mrs Greenaway Mr Koulianos Mr Luzuk Mrs Murray Mr Tanday

|  |  |
| --- | --- |
| **Assessment Conditions: *(N.B. Sufficient working out must be shown to gain full marks)***

|  |
| --- |
| * Calculators: Allowed
* Formula Sheet: Provided
* Notes: Not Allowed
 |

 |

**PART B – CALCULATOR ALLOWED**

Question 1 [3 marks]

Identify each of the following experiments as Binomial or not Binomial. For those identified as Binomial, **state the distribution**. For those identified as not Binomial, **state a reason**.

1. The number of hearts dealt in a hand of 5 cards from a shuffled deck of 52 cards
2. Spinning a spinner numbered 1 to 8 **ten** times, and counting the number of even numbers

that occur.

1. Flipping a fair coin and noting the number of flips required before a tail is observed

Question 2 [2 marks]

Three discs are drawn from a bag containing **three blue** and **two green** discs. If a disc is replaced after each selection, find the probability distribution for the random variable  , the number of

**blue discs** drawn, by completing the table below.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | 0 | 1 | 2 | 3 |
|  |  |  |  |  |

Question 3 [2 marks]

A discrete random variable X has a binomial distribution with a probability of success of p = 0.1

for **n** trials, where n > 2. If the probability of obtaining at least two successes after **n** trials is at

least 0.5, determine the smallest possible value of **n** .

Question 4 [2,2,2 - 6 marks]

The probability distribution of a discrete random variable ,  , is given in the table below.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 0 | 1 | 2 | 3 | 4 |
|  | 0.2 |  | 0.1 |  | 0.1 |

1. Determine the possible value(s) of .
2. Let 
3. Calculate 
4. Find 

Question 5 [2 marks]

The binomial variable,  , has  and 

Determine the parameters  and 

Question 6 [1, 2 - 3 marks]

The probability distribution function of a random variable,  , is shown below

|  |  |  |
| --- | --- | --- |
|  | 0 | 1 |
|  | 0.3 | 0.7 |

1. Determine 
2. Determine  if 

Question 7 [1,2,3 - 6 marks]

In the general population, it is estimated that 15% of males suffer from **Kitchenitus**

1. If a study group of 40 males is selected and tested, how many of the study group would you
expect to have kitchenitus?
2. If a study group of 10 males is selected and tested, determine the probability that

 **two** (2) of the males have kitchenitus

1. Determine the probability that it takes a selection of 10 males before 4 males with

 **the condition** have been selected.

Question 8 [1,3,3 - 7 marks]

A spinning wheel at a country fair has 15 numbers, 1-15. Each number has an equal chance of occurring.

A player pays $5 for one game. If a multiple of 4 occurs, the player receives their $5 back plus another $5 . If a 1 or 15 occurs, the player receives their $5 back plus another $10.

Otherwise, the player loses their $5.

1. Calculate the probability of a player winning $5 in one game
2. Calculate the expected gain for the player, when one game is played.
3. To make the game fair, the cost for the game is reduced. Find the new cost for

playing one game.

**End of section**