

**Churchlands Mathematics Department 2022**

Year 12 Mathematical Methods

Test 2 Resource Applications of Antidifferentiation, Fundamental Theorem, Exponential Function and Calculus of Trigonometric Functions.Discrete Random Variable

(3.1.1-3.1.6,3.1.9,3.2.4,3.2.5,3.2.15-3.2.22,3.3.1-3.3.8)

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| INSTRUCTIONS:  Calculator; Notes not allowed;Full working must be shown for all questions (or parts) worth more than 2 marks;Marks will be deducted for rounding and unit errors;Formula Sheet allowed |
| Name: Time:30 minutes Total / 35   |  |  |  |  | | --- | --- | --- | --- | | -1 | Rounding | Units | Notation | |

1. [ marks]

Atmospheric pressure, kilopascals (kPa), decreases approximately exponentially with increasing height h metres, above sea level according to the relationship , where is a constant. Atmospheric pressure at sea level is kPa, and halves with every

m increase in height.

1. Find the value of k, round to four significant figures.
2. Calculate the atmospheric pressure at the top of a mountain of height 3785 m.
3. Use the increments formula to find the approximate change in pressure as a climber descends 250m from the top of a mountain of height 3785m
4. [ marks]

A game involving a biased die is played. The six-sided die has faces marked with the numbers 1 through 6 inclusive. The probability associated with each outcome is given in the table below. is the number shown on the upper face of the die when it comes to rest after being thrown and is a constant.

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1. Determine the value of P(X=5)
2. Is the random variable X continuous or discrete? Briefly explain your answer.
3. The die is thrown twice. Determine the probability of an even number and an odd number being thrown, in either order.
4. The die is thrown three times. Determine the probability of a total of 16 or more when the three numbers are added together.
5. The cost to bet on the roll of the die is . If one or two is uppermost the player wins . If uppermost is three or four the player wins and loses if uppermost is a five or six. Is the player likely to win, lose or break even in the long term?
6. [ 2 marks]

The rate of change of temperature in degrees Celsius per minute for a cup of coffee is given by:

Where is in minutes.

What is the total change in the coffee temperature between and?

1. [4 marks]

Use calculus to find the area bounded by the curves and and the axis, for .

1. [ marks]

A discrete random variable has the probability distribution defined by the table below.

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1. If Find and
2. Determine
3. E(3Y+4)
4. Var(Y)
5. Var(2Y-5)