PART 1 - CALCULATOR INACTIVE Section – Show the key steps in your solutions .

1. Evaluate the following expressions. All final answers should be expressed as simplified fractions.

(6 marks)

(a) $2^3 \times 3^2 \times 4^0 =$

(b) $\left(0.2\right)^{-3} =$

(c) $-3^0 + 2^{-2} =$

(2)

(2)

(2)

2. The population of Mathville is being modeled by the exponential equation $P = 160\left(0.925\right)^t$, where P represents the population in thousands of people and t represents the time in years since 1995.

(6 marks)

(a) Is the town's population increasing or decreasing since 1995? Explain how you determined your answer.

(b) At what rate (as a percent) is the population changing every year? Explain how you determined your answer.

(2)

(2)

(c) If I want to use the equation to calculate the town's population in 2015, what value for t do I substitute into the equation?

(2)

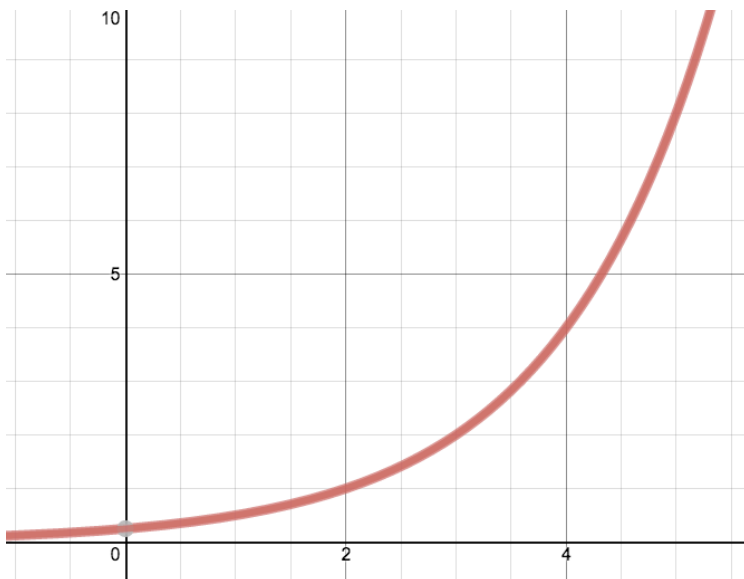3. Choose the equation that best models the graph presented.

(6 marks)

(a)

A	$y = 5(2)^x$
B	$y = 5 - 2x$
C	$y = 5(0.5)^x$
D	$y = 5 + 2x$
E	Not enough information available to answer this question

Explain your reasoning for your choice:

(3)

(b)

A	$y = 5(2)^x$
B	$y = 5 - 2x$
C	$y = 5(0.5)^x$
D	$y = 5 + 2x$
E	Not enough information available to answer this question

Explain your reasoning for your choice:

(3)

PART 2 – CALCUATOR ACTIVE – Show the key steps of the solutions to the following questions.

4. The number of newly reported cases of Mathitis, M, in the Cairo from 2001 to 2006 can be approximated by the equation, $C(t) = 28500(0.9567)^t$ where t represents the number of years since 2001

   a. Identify the initial amount and annual percent decrease

   (2)

   b. Estimate the number of newly reported cases that will be reported in this year of 2014. Briefly explain how you determined your answer or show your working.

   (2)

   c. In what year was the number of newly reported cases in Cairo approximately 25,000. Briefly explain how you determined your answer or show your working.

   (2)

5. Mr. Santowski has recorded the grades for the IM2 Semester Final for the last 7 years. He would like to know the equation that he should use to model the trend of IM2 Exam grades. The data table is provided below.

Year	2008	2009	2010	2011	2012	2013	2014
Grade	75.0	76.5	78.0	79.6	81.2	82.8	84.5

You are required to analyze the data USING TWO DIFFERENT ANALYSIS METHODS in order to write an exponential equation to model the trend in the data. Please show all work OR provide explanations as to what you are doing in your data analysis.

(a) METHOD 1:	(b) METHOD 2:
(3)	**(3)**

6. In 2000, the population of Manila was 10 million people and has been growing exponentially at a rate of 6.5% every year since 2000.

a. An equation that can be used to model this situation is: **(1)**

     i. $y = 10(1+6.5)^x$

    ii. $y = 10(1-6.5)^x$

   iii. $y = 10(1+0.065)^x$

   iv. $y = 10(1-0.065)^x$

    v. $y = 10+6.5x$

   vi. $y = 10+0.065x$

b. Explain why you selected your answer in part (a) **(2)**

c. Using the model for the population of Manila from part (a), what will the population be in 2025? **(2)**

d. Using the model for the population of Manila from part (a), the population of Manila will exceed 26 million in what year? **(3)**

e. Do you think this model can be used to predict future population of Manila, say in the year 2125? Explain. **(2)**