IM3 Unit 2 Quiz 1 - Calculator Active

October 29, 2017

Full marks are not necessarily awarded for a correct answer with no working. Answers must be supported by working and/or explanations. In particular, solutions found from a graphic display calculator should be supported by suitable working, e.g. if graphs are used to find a solution, you should sketch these as part of your answer. Where an answer is incorrect, some marks may be given for correct method, provided this is shown by written working. You are therefore advised to show all working..

SECTION A

Answer all questions in the spaces provided.

1. A population of spiders in the amazon can be modelled by the equation $P(t) = 12000e^{0.031t}$ where t is time in *days* and P is the total population.

   a. What is the initial population of spiders? *[1]*

   b. How many spiders will there be after 3 weeks? *[2]*

   c. Mr. Dunham is terrified of spiders. If ever the population grew to 1 million spiders, he would probably die of fright. How long will it be until that fateful day? *[3]*

2. Given the function $f(x) = 2^x$

   a. What is the value of $f(5)$? *[1]*

   b. What is the value of $f^{-1}(\frac{1}{8})$? *[2]*

   c. Suppose we shift $f(x)$ down by 3 units and right by 1 unit. Call this new function $g(x)$. Write down the equation of $g(x)$. *[3]*

   d. Write down the asymptote and the x- and y- intercepts of $g(x)$. *[3]*

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SECTION B

Do NOT write solutions on this page. Answer all questions on the answer sheets provided. In necessary round all answers to two decimal places.

1. Mr. Dunham invests his money in a fund which has 6% annual interest compounded quarterly.

    a. If he initially invests $10,000, how much money would he have after 8 years? *[2]*

    b. How long would it take for his money to ***double*** in value? *[3]*

    Mr. Dunham is saving up to buy a house. In order to do this he needs to save up a total of $35,000 for a down payment.

    c. How long will it take him to save up for this payment based on the initial investment of $10,000 from part a? *[3]*

    d. Mr. Dunham doesn't want to wait that long! He can only wait 10 years to do this. How much money does he need to ADD to his current $10,000 investment, so that he will have enough for the down payment in exactly 10 years time? *[4]*

    Turns out Mr. Dunham inherited $85,000 from his grandfather's estate! First thing he did was paid the 35,000 for his house. He now has 50,000 left over. He has two options:

    Option A: Invest all 50,000 at 5% p.a., compounded monthly.

    Option B: Invest in a company that doesn't pay any interest, but does give him an annual cash payment (a dividend) of $5000. *(Think linear equation)*

    e. Which option should Mr. Dunham choose? Why? Explain your choice and support it with mathematics. *[3]*