IM3 Unit 1 Exam - Paper 2 Calculator Active

September 27, 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

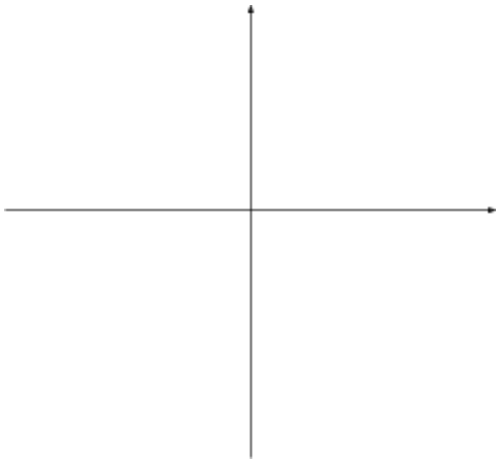
Answer all questions in the spaces provided. Show/explain the key steps of your solution.

1. Given the linear system:

$$3x - 4y - 16 = 0$$
$$y - 11 = -\frac{2}{3}(x - 3)$$

a. Use your graphing calculator to find a solution to this system. (2 marks)

b. Provide a sketch of the system below. Label the intersection point. (4 marks)

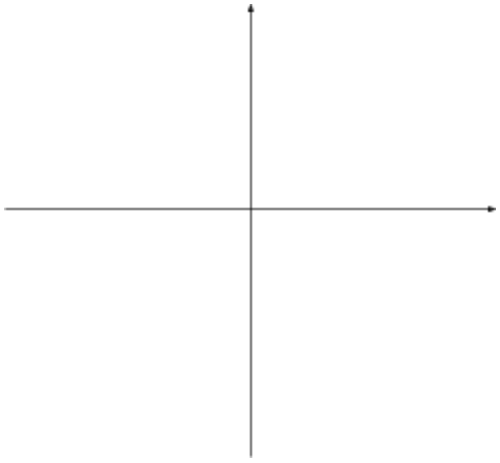


c. Determine the x-intercepts for each of the equations in this system. (2 marks)

2. Given the following piecewise function: $f(x) = \begin{cases} \frac{1}{2}x - 2 & x > 2 \\ -\frac{3}{4}x + m & x \leq 2 \end{cases}$

   a. Evaluate $f(6)$. (2 marks)

   b. Suppose $m = 3.5$. Sketch a graph of this function on the axes below. Label the x- and y-intercepts (3 marks)



   c. Determine a value for m so that $f(x)$ is continuous. (3 marks)

SECTION B

Do NOT write solutions on this page. Answer all questions on the answer sheets provided.

3. Omar wants to buy a Nintendo Switch this summer. Including Bomberman, Mario Kart 8 and two pro controllers this will cost him 900 USD. In order to earn money he has two jobs. He can tutor students in arabic for 20 USD per hour, or he can work as a house painter for 30 USD per hour.

    a. Let *x* represent hours tutoring, and let *y* represent hours painting. On the table provided, determine three combinations of hours worked that will earn him 900 USD. (4 marks)

	Hours of arabic tutoring (x)	Hours of house painting (y)
Option 1		
Option 2		
Option 3		

    b. Write the equation of a linear function modelling this situation. (3 marks)

    c. What is a logical domain and range for this equation? Explain your reasoning. (4 marks)

    d. Omar really only wants to work for 25 hours this summer. Can he earn enough money for his Switch in this amount of time? Why/Why not? (2 marks)

    e. Omar's mother makes him tutor arabic for 15 hours over the summer. If he spends the rest of his time painting, how many hours of painting would he have to do to achieve his target earnings? (2 marks)

    f. Ultimately Omar decides that he is going to split his time equally between tutoring and painting. In this case how many hours of each activity will he end up doing to earn enough money for his Nintendo? (3 marks)