Group Exam 1

Name: _____

Math 141, 12:40AM

Name of group member: _____

Professor Johnson

Name of group member: _____

Problem 1: (a) A United States President proposed the following plan to change the U.S. personal income tax system. According to his plan, the income tax would be 15% on the first $19,300 earned, 25% on the next $18,800 earned, and 35% on all income above and beyond that.

Find the amount of income tax owed for the following incomes. Show work by including the arithmetic that describes the origins of your numerical answers.

	income	taxed owed show work!
Person 1	$5,000	
Person 2	$15,000	
Person 3	$21,000	
Person 4	$30,000	
Person 5	$40,000	
Person 6	$60,000	

(b)Consider the function $T(x)$ that assigns to a given income amount , x, the tax owed , $T(x)$, according to the plan described above. The domain of $T(x)$ is all positive income amounts, equivalently $x \geq 0$. The formula for the function $T(x)$ is a piecewise linear function of the form below. Fill in the blanks.

$$T(x) = \begin{cases} \text{some formula goes here} & \text{if} \_\_\_\_\_ \\ \text{a formula goes here} & \text{if} \_\_\_\_\_ \\ \text{a formula goes here} & \text{if} \_\_\_\_\_ \end{cases}$$

(c) Find the formulas describe the function $T(x)$ on your specified intervals.

$$T(x) = \begin{cases} & \text{if} \_\_\_\_\_ \\ & \text{if} \_\_\_\_\_ \\ & \text{if} \_\_\_\_\_ \end{cases}$$

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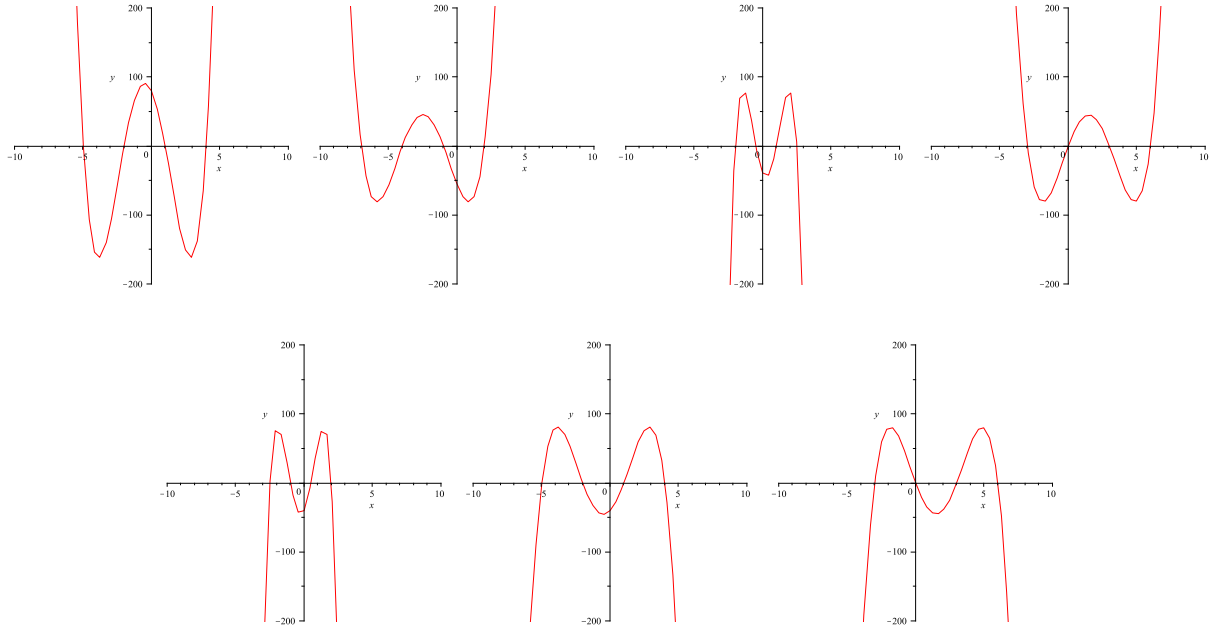
Calculator use is NOT permitted on this exam question.

Problem 2: (a) Below are five graphs. The graph of a function $f(x)$ is one of the them. The other graphs are of $-2f(x)$, $f(2x)$, $f(-2x)$, $-f(x+2)$, $-f(x-2)$and $f(x-2)$. Determine which is the graph of $f(x)$ and match the other functions with their graphs.



Write a **sentence** or two explaining why the graph of $f(x)$ must be the graph you selected.

(b) Evaluate the following trig expressions without using a calculator.

$\sin(-\frac{7\pi}{3})=$

$\cos(\frac{13\pi}{4}) =$

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Problem 3:

When a camera's flash goes off the batteries immediately begin to recharge the flash's capacitor, which stores electrical charge given by

$$Q(t) = Q_0(1 - 2.7^{-t/a})$$

The maximum charge capacity is Q_0 and t is measured in seconds.

(a) How long does it take to charge the capacitor to 90% of capacity if $a = 2$?

(b) Find the solution set to each equation below.

$\log_3(4^x - 2) = -1$

$\sin^2(x) - \cos(x)\sin(x) = 0$

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