Stony Brook

STATE UNIVERSITY OF NEW YORK

**MAT 122 Midterm I – Week of March 14, 2011**

==KEY==

Last Name:_____ First Name: _____ Recitation: R____

Section I: Write the answers to the following questions in the spaces provided. Little or no partial credit will be given. [2 points each].

1. _____1_____ In the graph at the right, find $f(2)$

2. _____3_____ If $f(x) = \ln(x) + 1$ find $f(e^2)$.

3. __$y = 1/2\,x + 1$__ Write an equation of the line through the points (2, 2) and (4, 3). Leave your answer in "y =" form.

Give 1 pt. for slope & 1 pt. for y-intercept
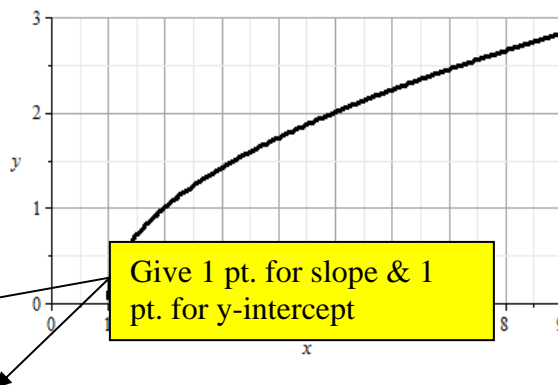
4. Slope:3/2 y int:-3 Determine the *slope* and *y-intercept* of the line whose equation is $3x - 2y = 6$

5. _____4_____ Find the *average rate of change* of the function $g(x) = x^3$ over the interval x = 0 to x = 2

6. _____2.43_____ Water is being circulated through a filter system. The number of grams of contaminant remaining in the pipe after *t* hours is given by the equation. $d(t) = 200(.23)^t$ How many grams remain after 3 hours? Give your answer <u>correct to the nearest hundredth</u>.

7. __2.322_____ Solve the equation $2^x = 5$ for x and leave the answer correct to the <u>nearest thousandth</u>.

8. __$6993.31_____ If $4,200 is invested in an account paying 4% compounded <u>annually</u>, how much is in the account at the end of 13 years, to the <u>nearest cent</u>

9. __$7064.52_____ If $4,200 is invested in an account paying 4% compounded <u>continuously</u>, how much is in the account at the end of 13 years, to the <u>nearest cent</u>

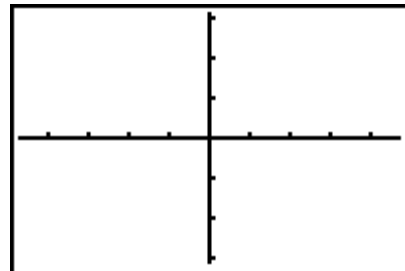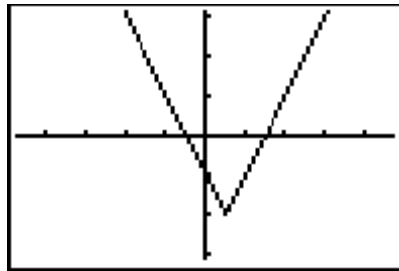10. __$3^2 = k$_____ Write in *exponential form*: $2 = \log_3 k$

11. __x = ln 5_____ Write in *log form*: $5 = e^x$

12. __$3x - 18x^2$__ If $f(x) = x - 2x^2$ and $g(x) = 3x$ find an equation for the function $(f \circ g)(x)$. Simplify your answer.
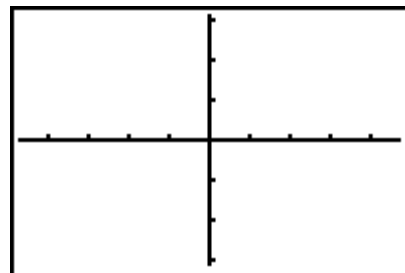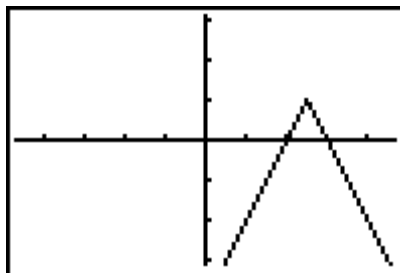
Directions: For questions 13, 14 and 15 sketch the function specified on the given axes based on the graph of f(x) given below.

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The graph of f(x)

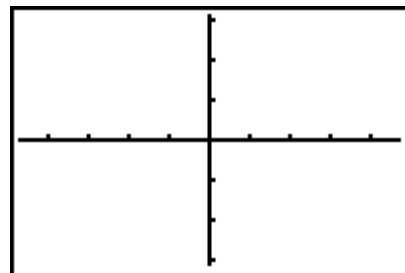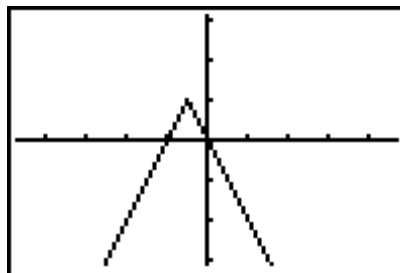Extra axes in case you make an error
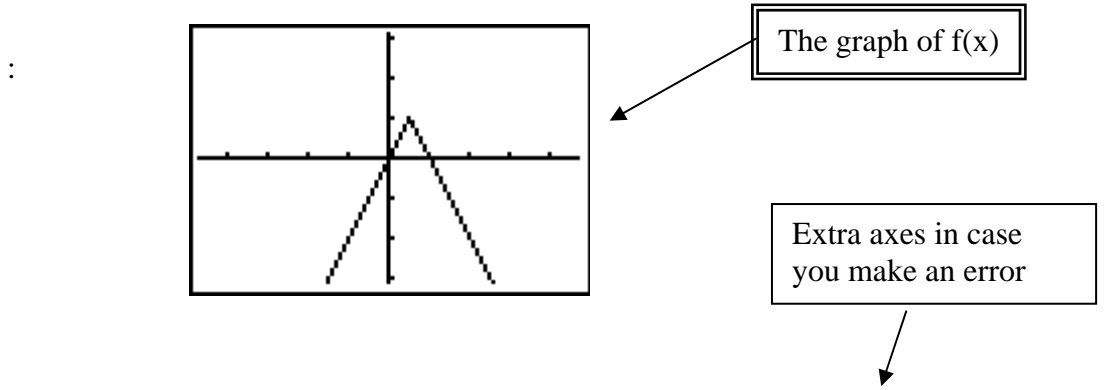
13. $-f(x) - 1$

14. $f(x - 2)$

15. $f(-x)$

Section II: Answer each question in the space provided. Show <u>all</u> work not done on the calculator. Circle your final answer. [10 points for <u>each part</u>, a) and b)]

16. Below is a table showing the values of three functions $y_1(x)$, $y_2(x)$ and $y_3(x)$. One is *linear*, one is *exponential* and one is *neither*. Answer the questions below for each function.

X	Y₁	Y₂	Y₃
0.00000	4.0000	0.0000	1.0000
1.0000	2.4000	.6931	1.7500
2.0000	1.4400	1.0986	2.5000
3.0000	.8640	1.3863	3.2500
4.0000	.5184	1.6094	4.0000
5.0000	.3110	1.7918	4.7500
6.0000	.1866	1.9459	5.5000

a) Which function is *linear*? Why? What is its equation?

Y3 because equal steps (increments) in x yield equal <u>steps</u> (increments) in y

m = .75 (They might be able to see this from the table without showing work.)

y = .75 x + 1

b) Draw its graph on the axes below using the given window.

```
WINDOW
Xmin=-1
Xmax=9.4
Xscl=1
Ymin=-1
Ymax=6.2
Yscl=1
Xres=■
```

Extra grid

c) Which function is *exponential*? Why? What is its equation?

Y1 because equal steps (increments) in x produce equal <u>ratios</u> in y

e.g. $\frac{2.4}{4} = .6, \frac{1.44}{2.4} = .6$ etc. $\Rightarrow a = .6$ in $y = y_0 a^x$ (or equivalent)
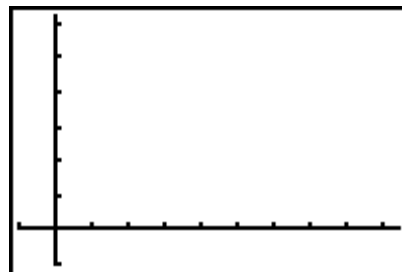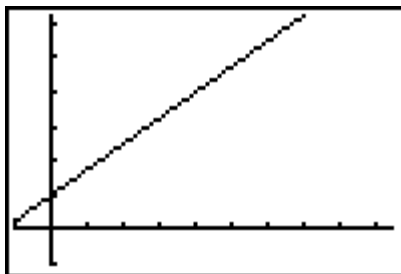
From table $y_0 = 4 \Rightarrow y = y(.6)^x$

d) Draw its graph on the axes below using the given window.

```
WINDOW
 Xmin=-1
 Xmax=9.4
 Xscl=1
 Ymin=-1
 Ymax=6.2
 Yscl=1
 Xres=∎
```

Take off points for inaccurate graphs. The y-intercept and shape should be approximately correct.