Math 41
Exam 1 - A
February 12, 2016
#1-12:8 pts each, #9: 4 pts.

name_____

***no calculators**

***show all relevant work to receive full credit**
***any evidence of academic dishonesty = 0 grade**
***only pencils, pens = - 5 from grade**
***late for exam= - 5 from grade**

1. Find the slope intercept equation of the line through the point $(-2,5)$ and

(a) parallel to the line $2x-y+4=0$

(b) perpendicular to the line $x=3$.

2. The population of a small town in central Pennsylvania was 8000 in the year 2010, and had decreased to 7500 by the year 2015. Find a linear model giving the population $\boldsymbol{P}$ in terms of the year $\boldsymbol{t}$, where $t=0$ corresponds to the year 2010.

3. Determine if the equation represents a function of y in terms of x. If it is not a function, explain your reasoning.

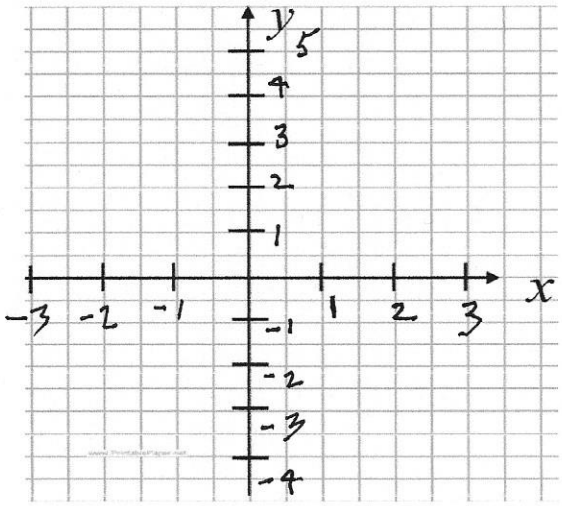
a. $y^2 - x^2 = 16$

yes or no, if no, explain.

b. $y = 4x^2 - 1$

yes or no, if no, explain

4. Sketch a graph of the function. $f(x) = \begin{cases} x+1, & x<0 \\ x^2-4, & x \geq 0 \end{cases}$



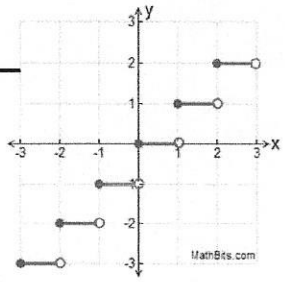
5. Determine if the statement is true **T** or false **F**. If false, explain why it is false or provide a counter-example.

a. The graph of an odd function is symmetrical to the x-axis. _____

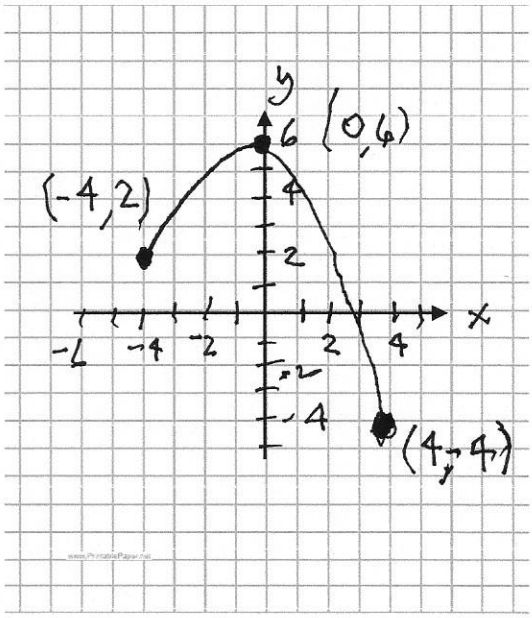
If false, explain.

b. The graph shown is that of ***the greatest integer function***, $f(x) = [\![x]\!]$ _____

If false, explain.



6. Use the graph of $y = f(x)$ to find the following:



(a) domain of f _____

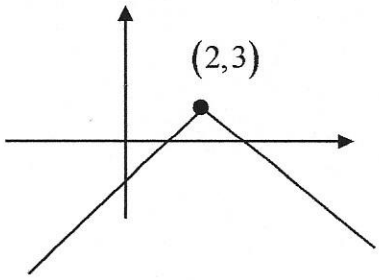
(b) range of f _____

7. For the function $f(x) = x^2 - 3x + 5$, find ***and*** simplify the difference quotient.

$$\frac{f(x+h) - f(x)}{h} =$$

8. Use the graph of $f(x) = |x|$ to write the equation for the function g whose graph is shown.

Assume no vertical stretch or shrink.



9. **Describe** the ***shape*** and the rigid ***transformations*** that gives the graph of $g(x) = -\frac{1}{4}(x-3)^2 - 2$ using the graph of $f(x) = x^2$. Not looking for a graph, but a written description.

10. Find each of the following for the given functions, $f(x) = x^2 + 1$, $g(x) = 2x - 3$

a. $(f \cdot g)(x)$

b. $(f - g)(x)$

11. For the composite function, $f(g(x))$ find two functions f and g, if $f(g(x)) = \sqrt{4x-5}$

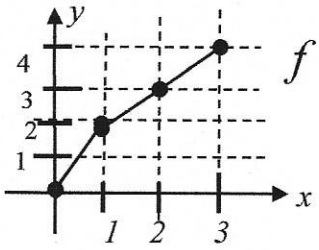
$f(x) =$

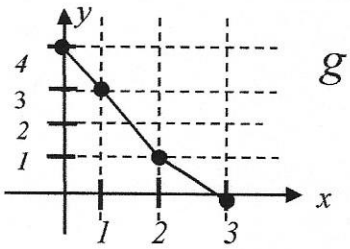
$g(x) =$

12. Find $f^{-1}(x)$, if it exists, for $f(x) = 27x^3 - 1$, If it does not exist, explain the reason(s).

13. (4 points): 4 points: Any plans for Valentine's Day?

Extra: Use the graph of f and g to find each of the following:

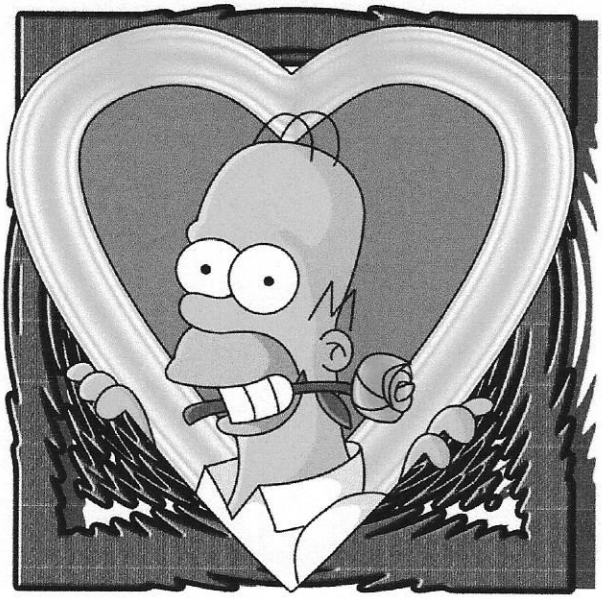




a. $g(f(1)) =$ $\boxed{}$

b. $(f + g^{-1})(3) =$ $\boxed{}$

c. $(g \circ f^{-1})(3) =$ $\boxed{}$

d. $g^{-1}(g(1)) =$ $\boxed{}$

Happy Valentine's Day