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

name Denise R. Shaking
***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 $2x-y+4=0$

$y=2x+4$ $m=2$
use same slope
$y-5=2(x-(-2))$
$y-5=2(x+2)$
$y-5=2x+4$
$y=2x+9$

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

$x=3$ vertical
so our line horizontal
$y=5$

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.

points (t,P) $(0,8000)$ $(5,7500)$

$m=\frac{\Delta P}{\Delta t}$
$=\frac{8000-7500}{0-5}$
$=\frac{500}{-5}=-100$

$P-P_1=m(t-t_1)$
$P-8000=-100(t-0)$
$P=-100t+8000$

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.

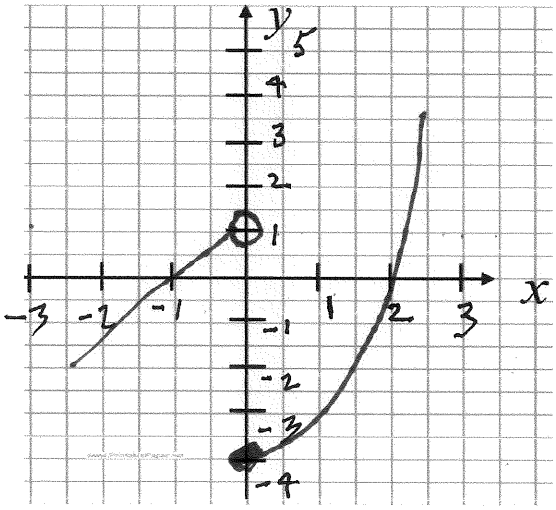
no, y^2 term

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

yes or no, if no, explain

yes,

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



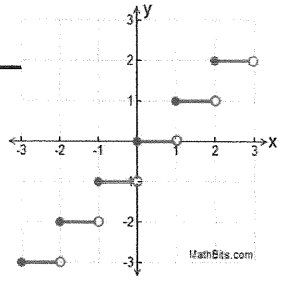
5. Determine if the statement is true **T** or false **F**. If false, explain why it is false or provide a counter-example.

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

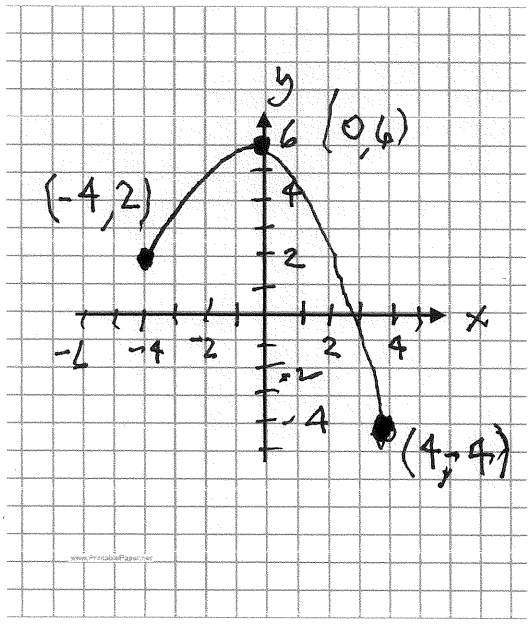
If false, explain. odd function symmetric to the origin
no functions are symmetric to x-axis

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

If false, explain.



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



(a) domain of f [-4,4]

(b) range of f [-4,6]

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

$$\frac{f(x+h)-f(x)}{h} = \frac{(x+h)^2 - 3(x+h) + 5 - (x^2 - 3x + 5)}{h}$$

$$= \frac{\cancel{x^2} + 2xh + h^2 \cancel{-3x} - 3h \cancel{+5} \cancel{-x^2} \cancel{+3x} \cancel{-5}}{h}$$

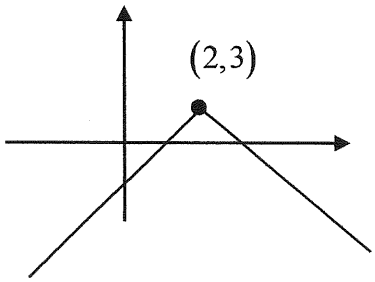
$$= \frac{h(2x + h - 3)}{h}$$

$$= 2x + h - 3$$

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.

$$g(x) = -|x-2| + 3$$



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.

A parabola shifted 3 units right, two units down, reflected about x-axis and a vertical shrink.

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

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

$= (x^2+1)(2x-3)$

$= 2x^3 - 3x^2 + 2x - 3$

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

$= (x^2+1) - (2x-3)$

$= x^2 - 2x + 4$

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

$f(x) =$ $\sqrt{x}$

$g(x) =$ $4x-5$

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

$y = 27x^3 - 1$

$x = 27y^3 - 1$

$x + 1 = 27y^3$

$\frac{x+1}{27} = y^3$

$y = \sqrt[3]{\frac{x+1}{27}}$

or

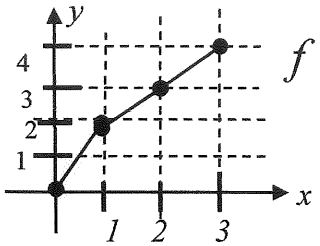
$y = \frac{1}{3}\sqrt[3]{x+1}$

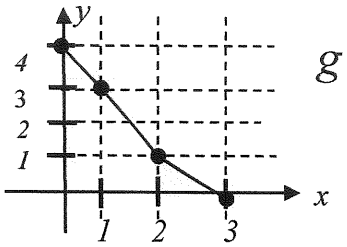
$f^{-1}(x) = \frac{1}{3}\sqrt[3]{x+1}$

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

Answer varies.

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





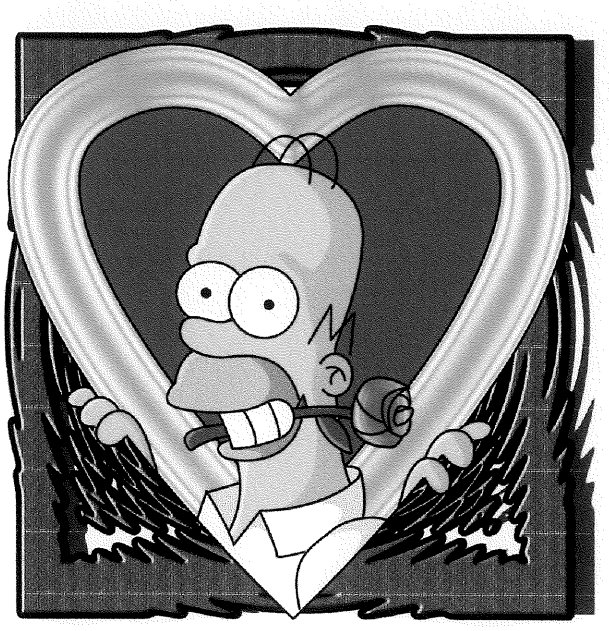
a. $g(f(1)) =$ 1

b. $(f + g^{-1})(3) =$ 5

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

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

Happy Valentine's Day



Math 41
Exam 1 - B WHITE
February 12, 2016
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name Denise R. Shaking

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

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

$y=-2x+4 \quad m=-2$

use same slope

$y-5=-2(x-(-2))$

$y-5=-2(x+2)$

$y-5=-2x-4$

$y=-2x+1$

(b) perpendicular to the line $x=4$.

given line vertical

so line horizontal $m=0$

$y=5$

2. The population of a small town in central Pennsylvania was 800 in the year 2010, and had decreased to 750 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.

points (t, P) $(0, 800)$ $(5, 750)$

$m=\frac{\Delta P}{\Delta t}=\frac{800-750}{0-5}=\frac{50}{-5}=-10$

$P-P_1=m(t-t_1)$

$P-800=-10(t-0)$

$P=-10t+800$

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

a. $y - x^2 = 16$

yes or no, if no, explain.

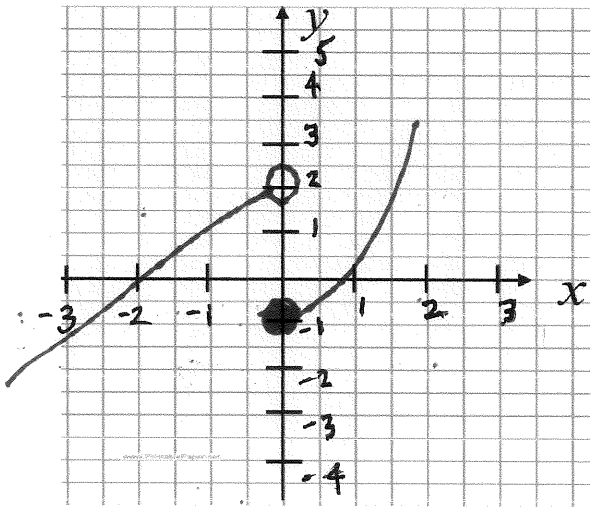
yes

b. $y^2 + 4x = 12$

yes or no, if no, explain

no, y^2 term

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



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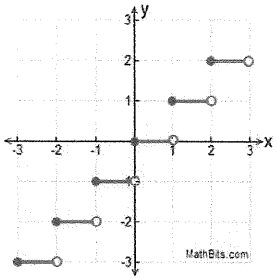

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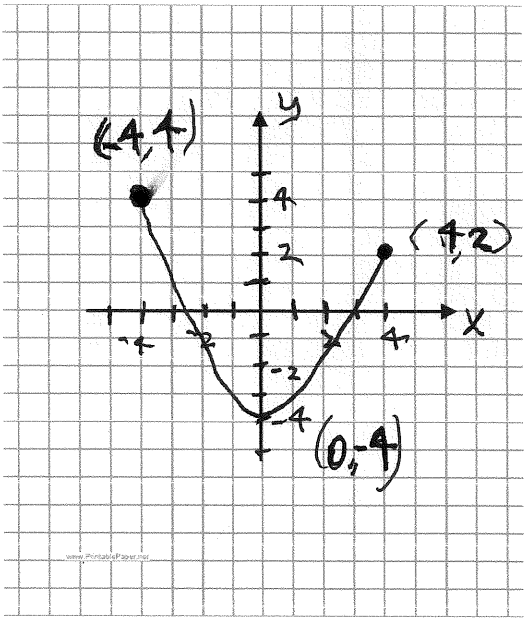

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$$= \frac{h(2x + h - 3)}{h}$$

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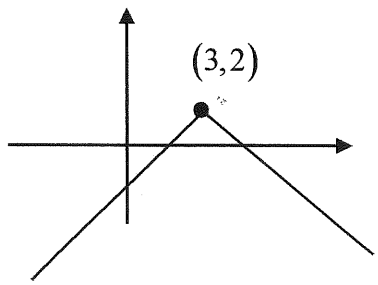

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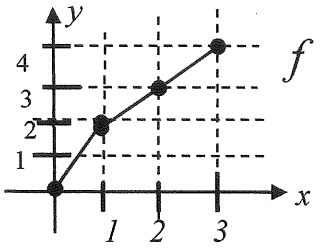
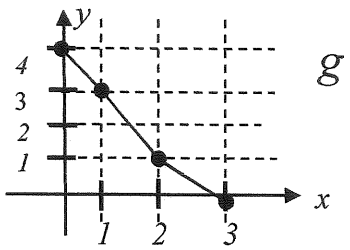
$f^{-1}(x) = \frac{1}{3}\sqrt{x+1}$

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:

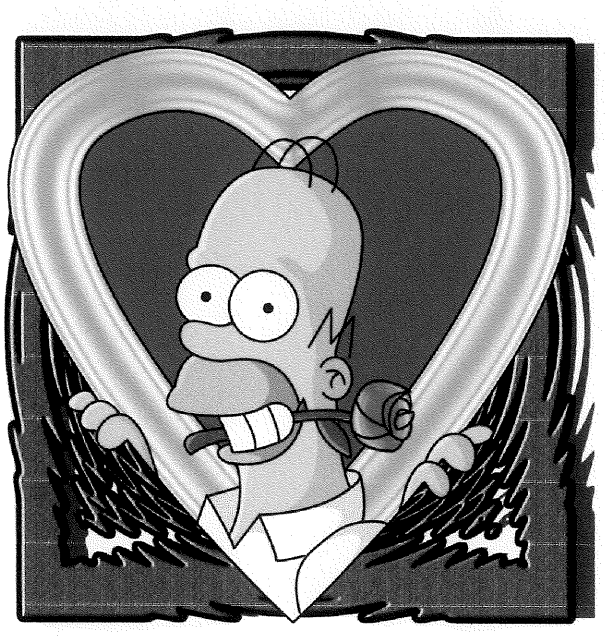




a. $g(f(2)) =$ $\boxed{0}$

b. $(f^{-1} + g)(2) =$ $\boxed{2}$

c. $(g \circ f^{-1})(2) =$ $\boxed{3}$

d. $g^{-1}(g(2)) =$ $\boxed{2}$

Happy Valentine's Day