Math 41 **name**_____

Exam 1 - A ***show all relevant work to receive full credit***

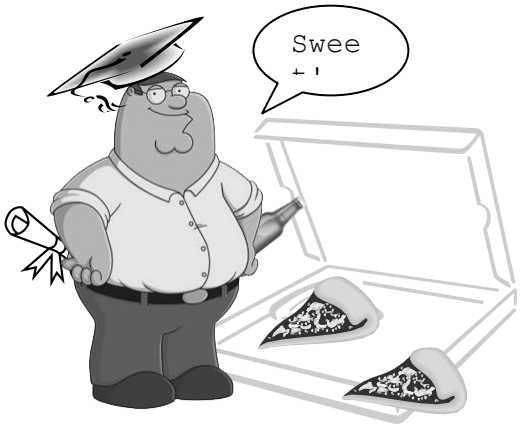
September 22, 2010

1. a. Find the equation of the line though the point $(2,-1)$ and parallel to the line $2x-5y-10=0$.

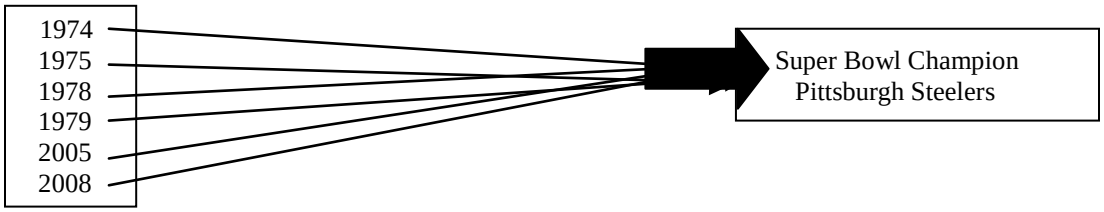
b. Find the equation of the line through the point $\left(-\frac{2}{3},-\frac{11}{5}\right)$ and perpendicular to the *y*-axis.

2. Since the appointment of Dean Peter Griffin, Ph D., J.D., M.D., D.D.S., B.F.F., L.O.L, as Dean of Students of a very small very liberal arts college in Quahog the enrollment has been increasing at a constant rate. Given that the enrollment was 500 in the year 2000, and had increased to 1000 by the year 2010.

   Find a linear equation giving the enrollment, ***N*** in terms of the year ***t***, where $t=0$ corresponds to the year 2000.



3. a. Determine if the following relations is a function.

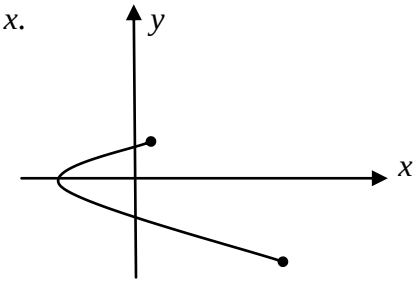


Yes or No, ***<u>if not</u>*** *explain.*_____

b. Determine if the equation represents a function of *y* in terms of *x*. $y = 16 - 9x^2$

Yes or No, ***<u>if not</u>*** *explain.*_____

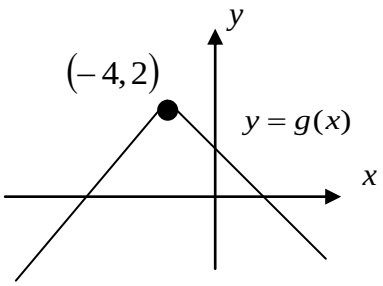
c. Determine if the graph represents a function of *y* in terms of *x*.



Yes or No, ***<u>if not</u>*** *explain.*_____

4. Use the graph of $f(x) = |x|$, to write the equation for the function $y = g(x)$ shown in the figure. *(Assume no vertical stretch nor shrink.)*

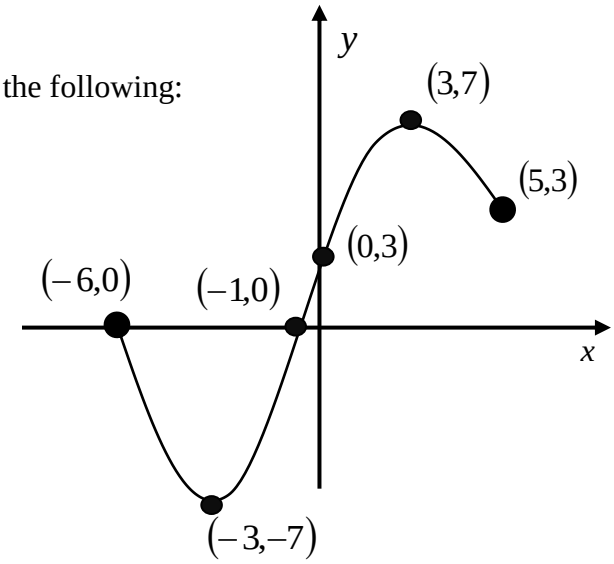
$g(x) =$



5. For the function $f(x) = x^2 - 5x + 1$, find ***and*** simplify the difference quotient.

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

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



a. domain:_____

range: _____

b. Interval(s) on which f is increasing:_____

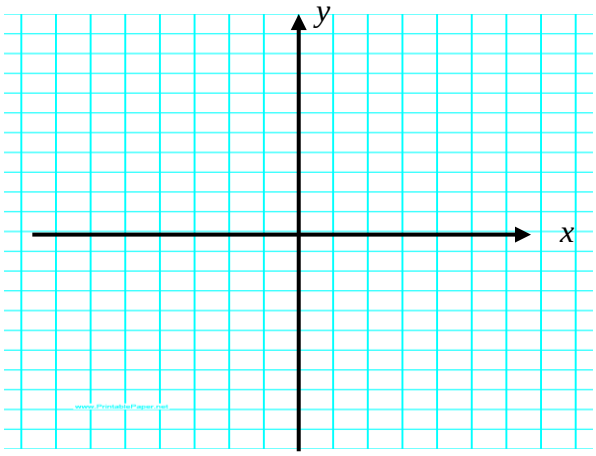
Interval(s) on which f is decreasing:_____

c. $f(3) =$

d. value(s) of x such that $f(x) = 0$, $x =$_____

7. ***Describe*** (in words) the shape of the graph as well as any transformation of the graph of the function, $h(x) = -\frac{5}{2}|x+2| - 3$ relative to the graph of $f(x) = |x|$. *(Because a graph is not necessary, a graph alone will not receive credit)*

8. ***Sketch*** a graph of the function. $f(x) = \begin{cases} x^2 + 1, & x \le 0 \\ x + 2, & x > 0 \end{cases}$



9. Answer **TRUE** or **FALSE** and **if false, explain why it is false** or provide a counterexample.

a) The graph of an even function is symmetric to the *x*-axis. _____.

b) The graph of an odd function is symmetric to the origin. _____.

10. Given the functions, $f(x) = x^2 - 3x + 4$, $g(x) = 2x - 5$ to determine the following:

a. $(f + g)(2) =$

b. $(f \circ g)(2) =$

11. Given the composite function $h(x) = f(g(x))$, find two functions f and g, such that $h(x) = f(g(x)) = \dfrac{1}{\sqrt{x^2 + 4}}$. *Answers are not necessarily unique.*

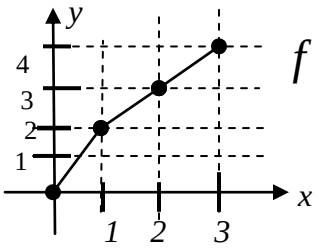
$f(x) =$

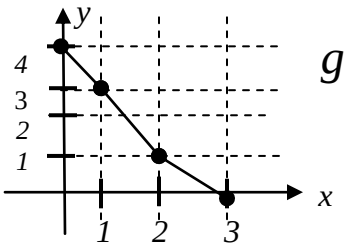
$g(x) =$

12. Find $f^{-1}(x)$, if it exists, for $f(x) = 8x^3 + 1$. If it does not exist, provide a reason(s).

13. (4 points): In your opinion,
the greatest song/title/record of all time, in any genre *(pop, rock, , punk, heavy metal, hip-hop, r&b, gospel, christian rock, blues, jazz, etc.)*

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





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

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

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