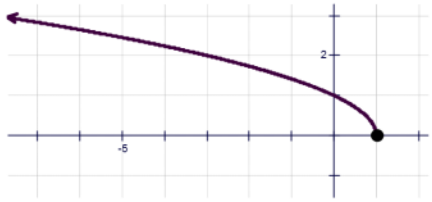
Saturday, October 21, 2017
9:50 PM

Precalc Test Review (1.4–1.9) Name KEY

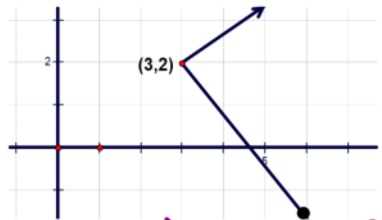
I. Use interval notation to give the domain and range for each of the following relations.

1.



D: $(-\infty, 1]$ R: $[0, \infty)$

2.



D: $[3, \infty)$ R: $[-2, \infty)$

II. Is y a function of x? Defend your answer with a mathematical reason or counter example.

3. $3y + 2x - 19 = 0$

* Function

$\frac{3y}{3} = \frac{-2x+19}{3}$

4. #1 above

Function

passes vert. line test

5. #2 above

NOT A Function

Fails vert. line test

6. $2x^2 + y = 9$

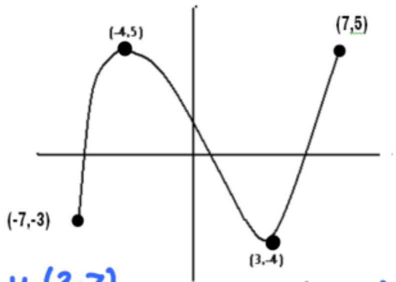
* Function

$y = -2x^2 + 9$

Each input has exactly one output

III. Determine the interval(s) in each of the following functions for which the function is increasing, decreasing, or constant.

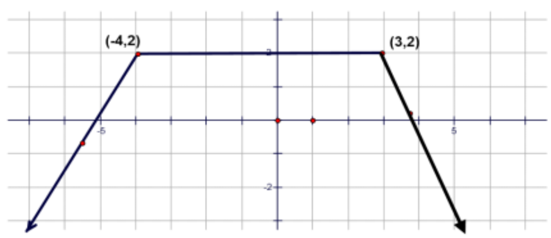
7.



INC: $(-7,-4) \cup (3,7)$

Dec: $(-4,3)$

8.



INC: $(-\infty, -4)$ Con: $(-4, 3)$ Dec: $(3, \infty)$

IV. Determine algebraically whether the given function is even, odd, or neither. Show all work!

9. $f(x) = \frac{1}{3}x^4 - 5x^2 + 1$ $\boxed{\text{even}}$

$f(-x) = \frac{1}{3}(-x)^4 - 5(-x)^2 + 1$

$= \frac{1}{3}x^4 - 5x^2 + 1 = f(x)$

10. $f(t) = -3t^3 + 2t^2 + 4$ $\boxed{\text{neither}}$

$f(-t) = -3(-t)^3 + 2(-t)^2 + 4$

$= 3t^3 + 2t^2 + 4$

11. $h(x) = 5x^5 - 3x$ $\boxed{\text{ODD}}$

$h(-x) =$

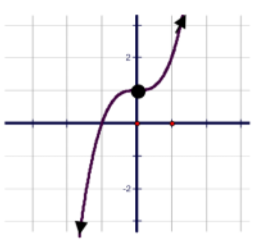
$5(-x)^5 - 3(-x)$

$= -5x^5 + 3x$

$= -h(x)$

V. Identify the parent function for each transformation shown. Write the equation for each graph.

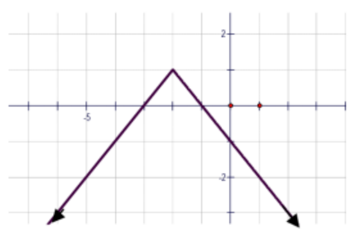
12.



$P(x) = x^3$

$f(x) = x^3 + 1$

13.



$P(x) = |x|$

$h(x) =$

$-|x+2| + 1$

VI. For each function, find the zeros *algebraically*. Write your answers as ordered pairs.

14. $f(x) = 3x^2 + 13x + 10$

$(3x + 10)(x + 1) = 0$

$3x + 10 = 0$ | $x + 1 = 0$

$3x = -10$

$\boxed{x = -10/3}$ $\boxed{x = -1}$

15. $h(x) = 2x^3 + x^2 - 10x$

$x(2x^2 + x - 10) = 0$

$x(2x + 5)(x - 2) = 0$

$\boxed{x = 0}$ $2x + 5 = 0$ $\boxed{x = -5/2}$ $\boxed{x = 2}$

* See work on next page

VII. Given that $f(x)=x^2+1$, $g(x)=x-4$ and $h(x)=[\![-2x]\!]$, evaluate the following. Simplify if necessary.

16. $(f+g)(-2)$ $\boxed{-1}$

17. $(f-g)(t-1)$ $\boxed{t^2-3t+7}$

18. $(h\cdot g)\left(-\frac{1}{4}\right)$ $\boxed{0}$

19. $\left(\frac{f}{g}\right)(0)$ $\boxed{-\frac{1}{4}}$

20. $(f\circ g)(x)$ $\boxed{x^2-8x+17}$

21. $(g\circ f)(-4)$ $\boxed{13}$

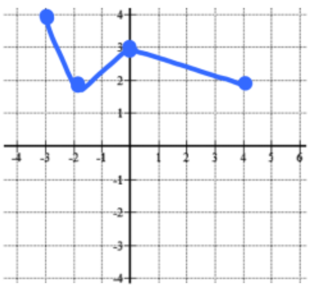
VIII. Given the graph of $f(x)$ at the right, sketch each of the following, labeling any significant points.

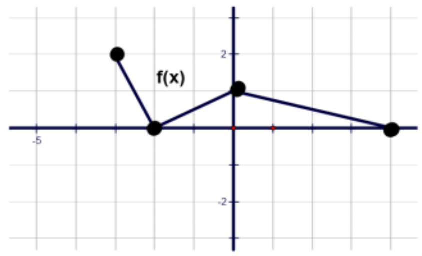
22. $g(x)=f(x)+2$

f(x)

x	y	g(x) y+2
-3	2	4
-2	0	2
0	1	3
4	0	2

x y



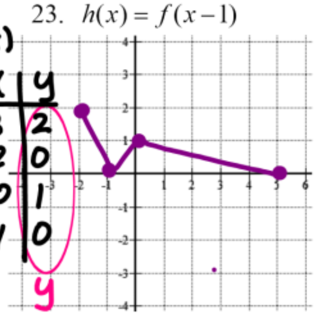


23. $h(x)=f(x-1)$

f(x)

x	y	x+1
-3	2	-2
-2	0	-1
0	1	1
4	0	5

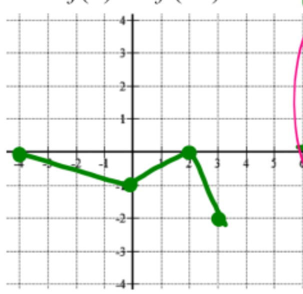
y x



24. $j(x)=-f(-x)$

-(x)	-(y)
3	-2
2	0
0	-1
-4	0

x y

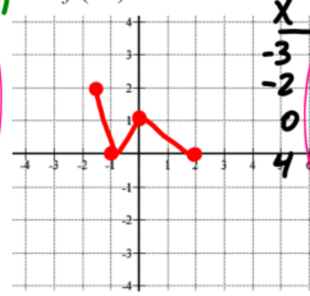


25. $f(2x)$

f(x)

x	y	f(2x) $\frac{1}{2}(x)$
-3	2	-1.5
-2	0	-1
0	1	0
4	0	2

y x



IX. Show that $f(x)=3-4x$ and $g(x)=\frac{3-x}{4}$ are inverse functions:

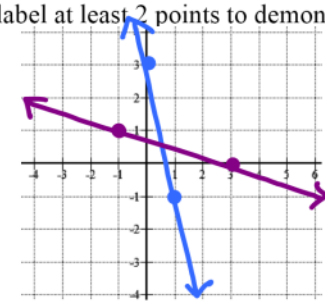
26. ***algebraically*** using the definition

$f(g(x)) = 3-\cancel{4}\left(\frac{3-x}{\cancel{4}}\right) = 3-(3-x) = x$ ✓

$g(f(x)) = \frac{3-(3-4x)}{4} = \frac{4x}{4} = x$ ✓

graph! $f(x)=-4x+3$

27. ***graphically*** (and label at least 2 points to demonstrate)



f(x) x	y
0	3
1	-1

g(x) x	y
3	0
-1	1

X. Determine whether or not each of the following functions has an inverse. If it does, find the inverse.

28. $r(x)=\frac{1}{x^2}$

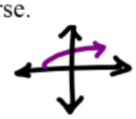
x	y
-2	$\frac{1}{4}$
-1	1
0	undef.
1	1
2	$\frac{1}{4}$

* Fails Horiz. Line test

Does not have an inverse function.

NOT one to one.

29. $w(x)=\sqrt{2x+3}$ yes - passes H.L.T.



$y=\sqrt{2x+3}$

$(x)^2=(\sqrt{2y+3})^2$

$x^2=2y+3$

$x^2-3=2y$

$y=\frac{x^2-3}{2}$

$\boxed{f^{-1}(x)=\frac{x^2-3}{2}}$

16) $(f+g)(-2)$

$f(-2) = (-2)^2+1 = 5$

$g(-2) = -2-4 = -6$

$f(-2) + g(-2) = 5 + -6 = \boxed{-1}$

17) $(f-g)(t-1)$

$f(t-1) = (t-1)^2+1 = (t-1)(t-1)^2+1 = t^2-2t+1+1$

$= t^2-2t+2$

$g(t-1) = t-1-4 = t-5$

$f(t-1)-g(t-1) = t^2-2t+2-t+5$

$= \boxed{t^2-3t+7}$

18) $(h\cdot g)(-\frac{1}{4})$

$h(-\frac{1}{4}) = [\![-2(-\frac{1}{4})]\!] = [\![\frac{1}{2}]\!] = 0$

$g(-\frac{1}{4}) = -\frac{1}{4}-4 = -4.25$

$h(-\frac{1}{4})\cdot g(-\frac{1}{4}) = 0(-4.25) = \boxed{0}$

19) $\left(\frac{f}{g}\right)(0)$

$f(0) = 0^2+1 = 1$ $\quad$ $g(0) = 0-4 = -4$

$\frac{f(0)}{g(0)} = \frac{1}{-4} = \boxed{-\frac{1}{4}}$

20) $(f\circ g)(x)$

$f(g(x)) = f(x-4) = (x-4)^2+1 = (x-4)(x-4)+1$

$= x^2-8x+16+1 = \boxed{x^2-8x+17}$

21) $(g\circ f)(-4)$

$f(-4) = (-4)^2+1 = 16+1 = 17$

$g(17) = 17-4 = \boxed{13}$