Acc. Pre-Calc Ch. 2 Review Name _____

Period _____

No Calculator

1. *If* $f(x)=x^2+2x-4$, *find* $f(a), f(a+h)$, *and* $\frac{f(a+h)-f(a)}{h}$

$f(a) = a^2+2a-4$ $\quad a^2+2ah+h^2+2a+2h-4$

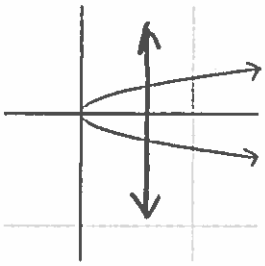
$f(a+h) = (a+h)^2+2(a+h)-4$

$a^2+2ah+h^2+2a+2h-4-a^2-2a+4$

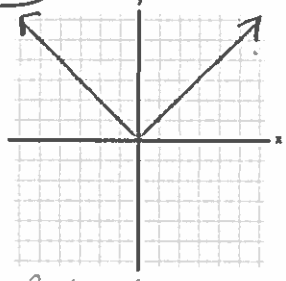
$\frac{h^2+2ah+2h}{h} = h+2a+2$

2. Which of the following figures are graphs of functions? State their domain and range. Which of the functions are one-to-one? Which functions are even, odd, or neither?

A)
Function: No
~~One-to-one~~
Domain $[0,\infty)$
Range $(-\infty,\infty)$
Even or ~~Odd~~

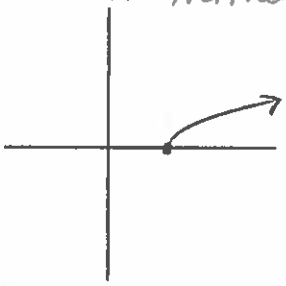


B)
Function: Yes
One-to-one No
Domain $(-\infty,\infty)$
Range $[0,\infty)$
Even or Odd,

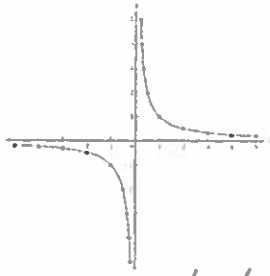


Reflects over y-axis

C)
Function: Yes
One-to-one Yes
Domain $[1.5,\infty)$
Range $[0,\infty)$
Even or Odd Neither



D)
Function: Yes
One-to-one Yes
Domain $(-\infty,0)\cup(0,\infty)$
Range $(-\infty,0)\cup(0,\infty)$
Even or Odd



Reflects about origin

3. Suppose the graph of $f(x)$ is given. **Describe** how the graphs of the following functions can be obtained from the graph of $f(x)$.

A) $y=f(x)+8$ shift $f(x)$ up 8

B) $y=f(x+8)$ shift $f(x)$ ← 8

C) $y=1+2f(x)$ shifts ↑1, stretches vert by factor 2

D) $y=f(x-2)-2$ shift $f(x)$ → 2 & ↓2

E) $y=f(-x)$ flips over y-axis

F) $y=-f(-x)$ flips about the origin

G) $y=-f(x)$ flips over x-axis

H) $y=f^{-1}(x)$ flips over $y=x$ line

I) $y=f(x-3)+2$ shift $f(x)$ → 3 and ↑2

4. Determine if the following are even, odd, or neither (without graphing). Show work.

Same -1

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

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

B) $f(x)=3x^2-2x$

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

Neither

C) $f(x)=5x^3-x$

$f(-x) = -5x^3+x$

odd

5. **If** $f(x)=x^2-3x+2$ **and** $g(x)=4-3x$

A) Find $f\circ g$ $f(g(x))$

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

$=16-24x+9x^2-12+9x+2$

$=\boxed{9x^2-15x+6}$

B) Find $g\circ f$ $g(f(x))$

$g(x^2-3x+2)=4-3(x^2-3x+2)$

$=4-3x^2+9x-6$

$=\boxed{-3x^2+9x-2}$

6. Determine if f(x) and g(x) are inverses. (Show your work)

A) $f(x)=3x-2$ and $g(x)=\frac{1}{3}x+2$

$\frac{1}{3}(3x-2)+2$

$x-\frac{2}{3}+2$

$\boxed{\text{No}}$

B) $f(x)=\frac{1}{x-1}$ and $g(x)=\frac{1}{x}+1$

$\frac{1}{\frac{1}{x-1}}+1=\frac{1}{1}\cdot\frac{x-1}{1}+1$

$=x-1+1=x$ ✓

$\boxed{\text{yes}}$

Calculator Allowed

7. *If* $f(x)=x^2+2x-4$, *find* $f(x+1)$ *and* $f(\sqrt{2})$

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

$x^2+2x+1+2x+2-4$

$\boxed{x^2+4x-1}$

$f(\sqrt{2})=(\sqrt{2})^2+2(\sqrt{2})-4$

$2+2\sqrt{2}-4=\boxed{-2+2\sqrt{2}}$

8. Find the domain and range of the following (You may want to look at a graph)

A) $f(x)=\sqrt{x+3}$ $x+3\geq 0$, $x\geq -3$

Domain $[-3,\infty)$

Range $[0,\infty)$

B) $f(x)=\frac{2}{x+1}$ $x\neq -1$, $y\neq 0$

Domain $(-\infty,-1)\cup(-1,\infty)$

Range $(-\infty,0)\cup(0,\infty)$

C) $f(x)=7x+15$ line

Domain $(-\infty,\infty)$

Range $(-\infty,\infty)$

9. Graph the function

$$f(x)=\begin{cases}-2 & \text{if } x\leq 0\\ \frac{1}{2}x-4 & \text{if } 0<x<4\\ (x-3)^2 & \text{if } x\geq 4\end{cases}$$

x	y
0	-2
-1	-2
-2	-2

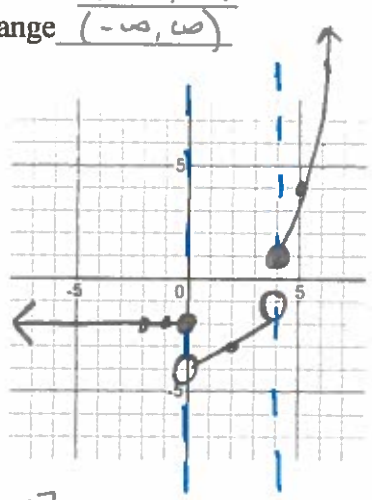
closed

x	y
0	-4
2	-3
4	-2

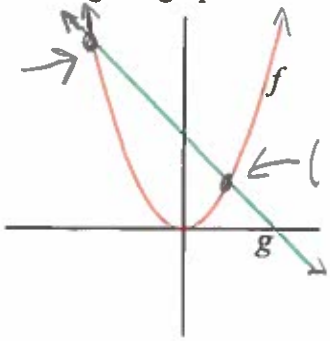
open

x	y
4	1
5	4
6	9

closed



10. Using the graph below…



(-2,4)

x values

a) Where is $f(x)\leq g(x)$ $[-2,1]$

b) Where is $f(x)>g(x)$ $(-\infty,-2)\cup(1,\infty)$

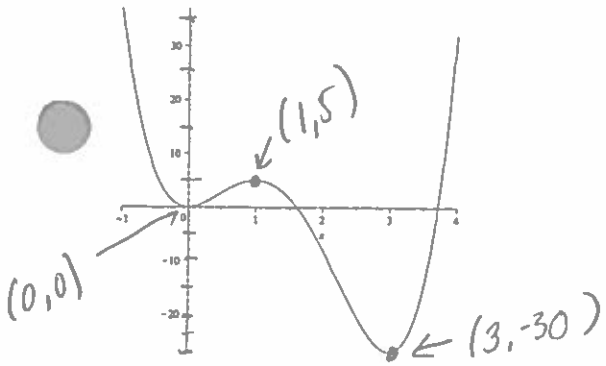
c) Where is f(x) increasing? $(0,\infty)$

d) Where is g(x) decreasing? $(-\infty,\infty)$

e) What is the net change of f, for x = -2 and x=1? $f(1)-f(-2)=\boxed{-3}$

f) What is the average rate of change for f for x = -2 and x=1? $\frac{-3}{1+2}=\frac{-3}{3}=\boxed{-1}$

11. Given the function below find any Local Max (s): (1,5) or $y=5$ upper humps
Local Min (s): (0,0) + (3,-30) or $y=0$ $y=30$ lower humps
Increasing Intervals: $(0,1) \cup (3,\infty)$
Decreasing Intervals: $(-\infty,0) \cup (1,3)$
Is the function one-to-one? NO
Even or odd? WHY Neither
not reflective over y-axis (even)
not reflective about origin (odd)



12. Let $f(x)=2x+1$, find $f(a)$, $f(h+a)$, the net change, and the average rate of change.

$f(a)=2a+1$ $f(h+a)=2(h+a)+1$ $f(h+a)=2h+2a+1$

$Net\Delta = f(h+a)-f(a)$
$=(2h+2a+1)-(2a+1)$
$2h+2a+1-2a-1$
$Net\Delta = 2h$

$Avg.\Delta = \frac{2h}{h} = 2$

13. Let $f(x)=3x^2-2x$, find the net change, and the average rate of change for x = - 4 and x = 2.

$f(2)-f(-4)$ $f(-4)=3(16)-2(-4)$ $48+8=56$

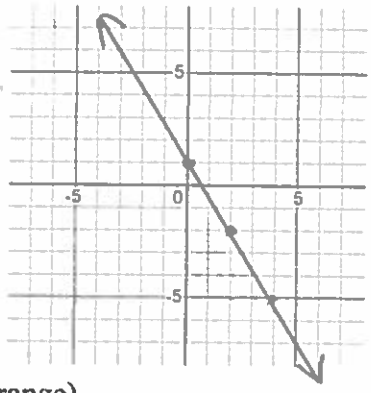
$Net\Delta = 8-56=-48$ $Avg\Delta = \frac{-48}{2-(-4)} = -8$

$f(2)=3(4)-2(2)=12-4=8$

14. A) Sketch the graph $f(x)=1-\frac{3}{2}x$

B) what is the slope of the graph? $-3/2$

C) What is the rate of change of the function? $-3/2$

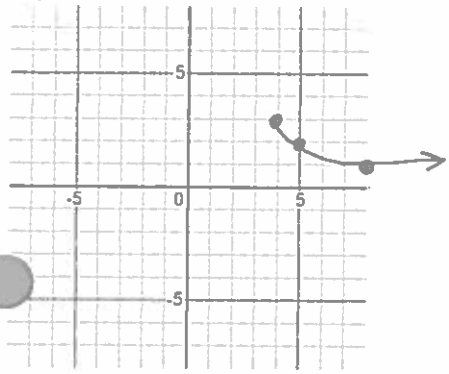


15. Sketch the graphs of the following functions (state the domain and range)

A) $y=3-\sqrt{x-4}$

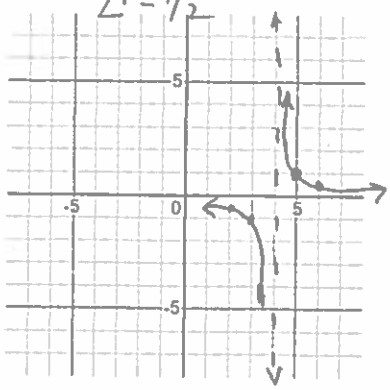
X	Y
4	3
5	2
8	1

$X-4\geq 0$
$X\geq 4$
$D:[4,\infty)$
$R:(-\infty,3]$



B) $g(t)=\frac{1}{x-4}$ $X\neq 4$ $y\neq 0$

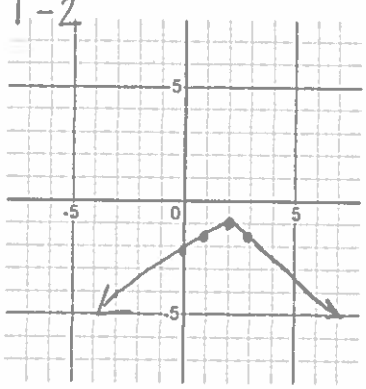
X	Y
5	1
6	1/2
3	-1
2	-1/2



$D:(-\infty,4)\cup(4,\infty)$
$R:(-\infty,0)\cup(0,\infty)$

C) $f(x)=-\frac{1}{2}|x-2|-1$

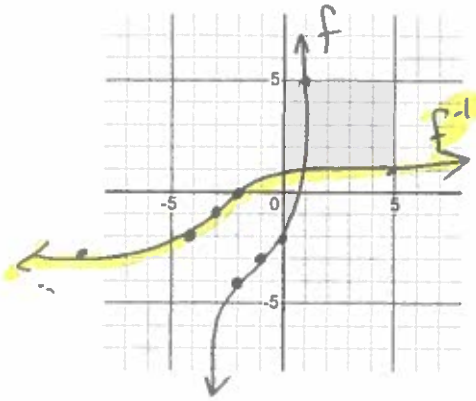
X	Y
2	-1
3	-1.5
1	-1.5
0	-2



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

16. Find the inverse of the function and graph **both**.

A) $f(x)=(x+1)^3-3$ $f^{-1}(x)=\sqrt[3]{(x+3)}-1$ B) $f(x)=\frac{2x+1}{3}$ $f^{-1}(x)=\frac{3x-1}{2}$



f	
X	Y
-2	-4
-1	-3
0	-2
1	5
-3	-11

f^{-1}	
-11	-3
-4	-2
-3	-1
-2	0
5	1

switch

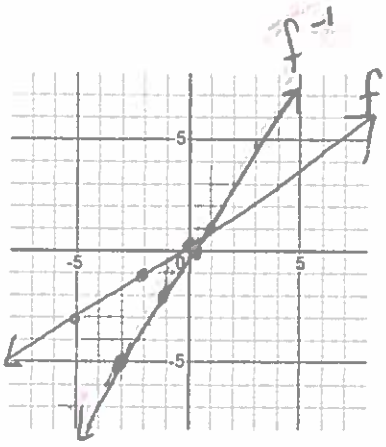
$y=(x+1)^3-3$

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

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

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

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



f	
X	Y
-5	-3
-2	-1
0	1/3
1	1

f^{-1}	
-3	-5
-1	-2
1/3	0
1	1

$y=\frac{2x+1}{3}$

$x=\frac{2y+1}{3}$

$3x=2y+1$

$3x-1=2y$

$\frac{3x-1}{2}=y$