Pre-Calculus AB Review
Chapter 3.5-3.7

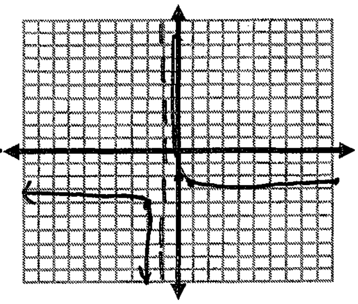
Name: ______________________
Date: ______________________ Per: ______

*****Part I – No Calculator*****

Graph each of the following parent functions.

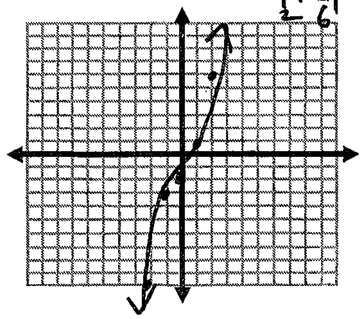
1) $y = \dfrac{1}{x+1} - 3$

2	4
0	2



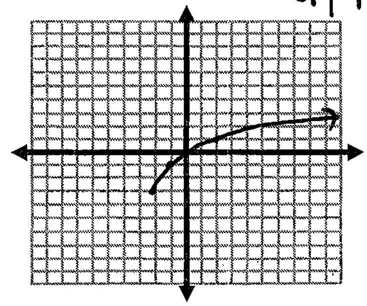
2) $y = x^3 - 2$

-4	-30
0	-2
1	-1
2	6

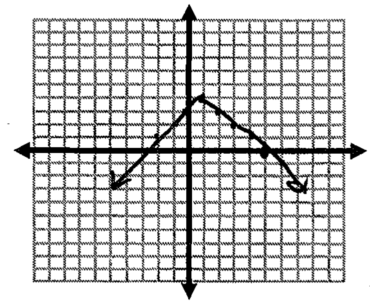


3) $y = 2\sqrt{x+2} - 3$

-2	-3
-1	-1
2	1



4) $y = -|x-1| + 4$



Write a rule (parent function with transformations) for the function whose graph can be obtained from the given parent function and the given transformations:

5) Parent function: $f(x) = x^3$

Transformations:* *shift graph 4 units up, vertically stretched by a factor of 2, reflect over the y-axis

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

6) Parent function: $f(x) = \sqrt{x}$

Transformations:* *reflect across x-axis, compress horizontally by a factor of ¼, shift 3 units right

$f'(x) = -\sqrt{4x-3}$

Describe the sequence of transformations that transform the graph of the function *g* from the parent function.

7) $g(x) = 4(x+1)^2 - 3$

Parent Function: $y = x^2$

Down 3

~~[illegible]~~ Left 1

Vertical Stretch by 4

8) $g(x) = -\sqrt{\frac{1}{4}(x-3)}$

Parent Function: Square Root

Reflected across x-axis

Horizontal Stretch by 4

Right 3

Use the given to find the following. Then state the domain.

Given $f(x) = 3x + 1$ and $g(x) = 2 - x$:

8) $(f+g)(x) =$ $2x + 3$ Domain: $(-\infty, \infty)$

9) $(f-g)(x) =$ $4x - 1$ Domain: $(-\infty, \infty)$

10) $(fg)(x) =$ $-3x^2 + 5x + 2$ Domain: $(-\infty, \infty)$

11) $\left(\dfrac{f}{g}\right)(x) =$ $\dfrac{3x+1}{2-x}$ Domain: $(-\infty, 2) \cup (2, \infty)$

Part II – With Calculator

Use the given to find the following.

For $f(x)=x^2-x$ and $g(x)=1+x$:

12) $(g\circ f)(-2)$ 7

13) $f(g(2))$ 6

14) $(g\circ g)(1)$ 3

For $f(x)=x^2-x$ and $g(x)=1+x$:

15) $f(g(x))$

x^2+x

16) $g\circ f=$

x^2-x+1

17) $g\circ g=$

$x+2$

18) $f(f(g(x)))$

$(x^2+x)^2-(x^2+x)$

Find the inverse relation of each function.

19) $f(x)=x^3-3$

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

19) $g(x)=\sqrt{2x^2-1}$

$g^{-1}=\pm\sqrt{\frac{x+1}{2}}$

20) $h(x)=\dfrac{3x+1}{x-2}$

$h^{-1}=\dfrac{2x+1}{x-3}$

Use composition to determine if these functions are inverses of each other. Show your work.

21) $f(x)=2x-6 \quad g(x)=\frac{x}{2}+3$

$f(g(x))$ $\quad 2(\frac{x}{2}+3)-6$ $\quad g(f(x))$ $\quad \frac{2x-6}{2}+3$

$f(\frac{x}{2}-3)$ $\quad x+6-6$ $\quad g(2x-6)$ $\quad x-3+3$

$\boxed{x}$ $\quad \boxed{x}$

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

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

$f(\sqrt[3]{x+1})$ $\quad \boxed{x}$ $\quad g(x^3-1)$

$(\sqrt[3]{x+1})^3-1$ $\quad \sqrt[3]{x^3-1+1}$

Find the average rate of change of the function over the given interval.

23) $f(x)=-\sqrt{2x^2-x+4}$ from $x=0$ to $x=3$

-0.7863

24) $f(x)=\dfrac{x^2-3}{2x-4}$ from $x=3$ to $x=6$

$\frac{3}{8}$

Compute using the difference quotient.

25) $f(x)=x^2+6$

$\dfrac{(x+h)^2+6-x^2-6}{h}$

$\dfrac{x^2+2xh+h^2+\cancel{6}-\cancel{x^2}-\cancel{6}}{h}$

$\dfrac{2xh+h^2}{h}$

$\dfrac{h(2x+h)}{h}$ $\boxed{2x+h}$

Using the answer from #25, find the rate of change.

26) $x=2$ to 2.5

$2(2)+0.5$

$\boxed{4.5}$

27) The distance s (in feet) an object falls is given by the model $s=16t^2+120$, find the average distance the object fell:

a) from 0 seconds to 4 seconds

64 ft/seconds

b) from 2 seconds to 6 seconds.

128 ft/seconds

28) The estimated revenues r (in billions of dollars) from sales of digital music from 2002 to 2007 can be approximated by the model $r=15.639t^3-104.75t^2+303.5t-301,\ 2\le t\le 7$ where t represents the year with t = 2 corresponding to 2002. Find the average rate of change in revenue from 2002 to 2007.

408.5576 billion dollars