Name Answer key

Period# ______

Pre-Calculus: CH#2 Review

1. Evaluate the function

$f(x)=5x^2+4x-5$ at $f(5)$.

$f(5)=5(5^2)+4(5)-5$

$5\cdot 25$

$125+20-5=\boxed{140}$

2. For the function $f(x)=3x^2+7$

Find $\frac{f(a+h)-f(a)}{h}$. $=\frac{\cancel{3a^2}+6ah+3h^2\cancel{+7}-\cancel{3a^2}-\cancel{7}}{h}$

$f(a+h)=3(a+h)^2+7$

$=3(a^2+2ah+h^2)+7$

$=3a^2+6ah+3h^2+7$

$=\frac{6ah+3h^2}{h}$

$=\boxed{6a+3h}$

3. Find the domain. (Write as an interval)

(a) $\frac{7}{4x+12}$ $=0$

$4x=-12$

$x\neq -3$

$\boxed{(-\infty,-3)\cup(-3,\infty)}$

(b) $\sqrt{x+9}\geq 0$

$x\geq -9$

$\boxed{[-9,\infty)}$

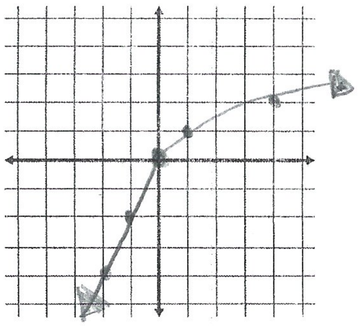
(c) $\frac{1}{x^2+x}$

$x\neq 0$ $x\neq -1$

$\boxed{(-\infty,-1)\cup(-1,0)\cup(0,\infty)}$

4. Sketch the graph of the piecewise function.

$$f(x)=\begin{cases}\sqrt{x} & x\geq 0\\ 2x & x<0\end{cases}$$



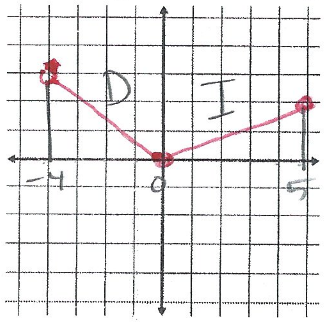
closed

x	y
0	0
1	1
4	2

open

x	y
0	0
-1	-2
-2	-4

5. Determine the interval on which the function is increasing and decreasing.



$D: (-4,0]$

$I: [0,5]$

6. Find the average rate of change of the function

$f(x)=x^2+3x+10$, from x=-2 to x=4

$\frac{f(b)-f(a)}{b-a}=\frac{f(4)-f(-2)}{4+2}$

$f(4)=4^2+3(4)+10$

$=16+12+10=\boxed{38}$

$f(-2)=(-2)^2+3(-2)+10$

$4-6+10=8$

$=\frac{38-8}{6}$

$=\frac{30}{6}$

$=\boxed{5}$

7. Compute the difference quotient.

Determine the average rate of change of the

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

between a=x and b=x+h.

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

$\frac{\cancel{2x^2}+4xh+2h^2\cancel{+3x}+3h\cancel{-1}-\cancel{2x^2}-\cancel{3x}\cancel{+1}}{h}$

$=\frac{4xh+2h^2+3h}{h}$

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

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

$=2x^2+4xh+2h^2+3x+3h-1$

$=\boxed{4x+2h+3}$

8. Describe the transformation of the function.

(a) $f(x)=-7x^3-3$

- reflect x-axis
- vertical stretch by 7
- down 3

(b) $f(x)=(x-5)^2+8$

right 5

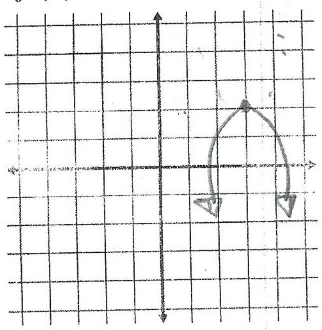
up 8

9. Write the equation, given the transformation. Given: $f(x) = x^2$, left 5, vertical stretch by a factor of 4, and shift downward 5.

$\boxed{f(x) = 4(x+5)^2 - 5}$

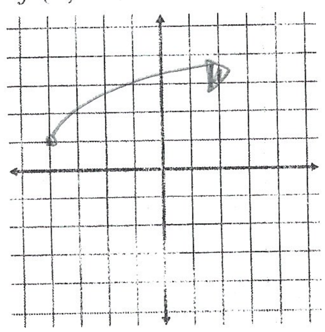
10. Graph the transformations.

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



Right 3
up 2
reflect
x-axis

(b) $f(x) = \sqrt{x+4} + 1$



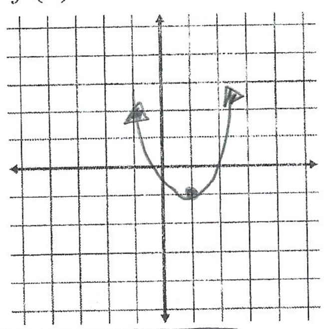
left 4
up 1

11. Find the coordinates of the vertex. Write the equation in standard form. Find the x and y intercepts. Then graph.

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

$x = \frac{-b}{2a} = \frac{+2}{2(1)} = \boxed{1}$

$y = 1^2 - 2(1)$
$= 1 - 2$
$= \boxed{-1}$



$\boxed{\text{vertex } (1,-1)}$

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

x int
let y=0
$x^2 - 2x = 0$
$x(x-2) = 0$
$\boxed{x=0 \quad x=2}$

y-int
let x=0
$\boxed{y=0}$

12. Find the vertex and write the equation in standard form.

$f(x) = \overset{a}{-}x^2 + \overset{b}{6}x + \overset{c}{4}$

$x = \frac{-b}{2a} = \frac{-6}{2(-1)} = \frac{-6}{-2} = \boxed{3}$

$y = -3^2 + 6(3) + 4$
$= -9 + 18 + 4$
$9 + 4 = \boxed{13}$

$\boxed{\text{vertex } (3,13)}$

$\boxed{f(x) = -(x-3)^2 + 13}$

13. Find the maximum or minimum of the function

$f(x) = -4x^2 + 48x - 50$

$x = \frac{-b}{2a} = \frac{-48}{2(-4)} = \frac{-48}{-8} = \boxed{6}$

$f(x) = -4(6^2) + 48(6) - 50$
$= -4(36) + \quad -50$
$= -144 + 288 \quad = \boxed{94}$

$\boxed{\text{max } f(6) = 94}$

14. Use $f(x) = 2x - 6$ and $g(x) = 5 - x^2$ to evaluate the expression. Find the domain for each.

(a) $f - g$ $\quad 2x - 6 - (5 - x^2)$
$2x - 6 - 5 + x^2$
$\boxed{x^2 + 2x - 11}$ $\quad D(-\infty,\infty)$

(b) fg
$(2x-6)(5-x^2)$
$10x - 2x^3 - 30 + 6x^2$
$\boxed{-2x^3 + 6x^2 + 10x - 30}$
D: $-\infty,\infty$

15. Given $f(x) = x^2$ and $g(x) = x + 3$. Find $(g \circ f)(x)$

$g(f(x))$
$\downarrow$
$g(x^2) = \boxed{x^2 + 3}$

16. Given $f(x) = x^7 + 3$, $g(x) = x - 10$ and $h(x) = \sqrt{x}$. Find $f \circ g \circ h$.

$f(g(h(x)))$

$\downarrow$

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

$\downarrow$

$f(\sqrt{x} - 10) = \boxed{(\sqrt{x} - 10)^7 + 3}$

17. Assume f is a one-to-one function. If $f(x) = 3 - 6x$, find $f^{-1}(x)$.

$y = 3 - 6x$

$x = 3 - 6y$

$-3 \quad -3$

$\frac{x-3}{-6} = \frac{-6y}{-6}$

$\boxed{f^{-1}(x) = \frac{-x+3}{6}}$

18. Find the inverse of $f(x) = 7x + 28$

$y = 7x + 28$

$x = 7y + 28$

$-28 \quad -28$

$\frac{x-28}{7} = \frac{7y}{7}$

$\boxed{f^{-1}(x) = \frac{x-28}{7}}$

19. Given $f(x) = \frac{x-2}{x-7}$. Find $f^{-1}(x)$.

$y = \frac{x-2}{x-7}$

$\frac{x}{1} = \frac{y-2}{y-7}$

$y - 2 = xy - 7x$

$-xy + 2 \quad -xy \quad +2$

$y - xy = -7x + 2$

$\frac{y(1-x)}{1-x} = \frac{-7x+2}{1-x}$

$\boxed{f^{-1}(x) = \frac{-7x+2}{1-x}}$

20. Show that f and g are inverse of each other.

Given: $f(x) = 2x - 5, g(x) = \frac{x+5}{2}$

$f(g(x))$

$\downarrow$

$f\left(\frac{x+5}{2}\right) = 2\left(\frac{x+5}{2}\right) - 5$

$= x + 5 - 5$

$= \boxed{x}$

21. Solve the quadratic equation

$5x = x^2 - 1 \qquad x^2 - 5x - 1 = 0$

$\frac{5 \pm \sqrt{(-5)^2 - 4(1)(-1)}}{2(1)}$

$\frac{5 \pm \sqrt{25 + 4}}{2} = \boxed{\frac{5 \pm \sqrt{29}}{2}}$

22. Simplify $\frac{2x+10}{9x^2 - 25} \div \frac{x^2 + 2x - 15}{3x^2 - 4x - 15}$

$\frac{2\cancel{(x+5)}}{\cancel{(3x+5)}(3x-5)} \quad \frac{\cancel{(3x+5)}\cancel{(x-3)}}{\cancel{(x+5)}\cancel{(x-3)}}$

$-15 \quad 5 \quad -3 \quad 2 \quad -45 \quad 3x \quad 5 \quad -4 \quad -9$

$= \boxed{\frac{2}{3x-5}}$

23. Simplify $\frac{6a^4b^5c^{-2}}{(a^{-3}b^3c)^3}$

$= \frac{6a^4b^5c^{-2}}{a^{-9}b^9c^3}$

$= \boxed{\frac{6a^{13}}{b^4c^5}}$