Honors Algebra 3-4
Ch 1 Review worksheet

Name: Key
Period: ____

#1. Which sets of ordered pairs represent a function from A to B. Give reasons for your answers.

$A = \{10, 20, 30, 40\}$ *and* $B = \{0, 2, 4, 6\}$

(a) $\{(20,4), (40,0), (20,6), (30,2)\}$ NO, input with multiple outputs
(b) $\{(10,4), (20,4), (30,4), (40,4)\}$ yes
(c) $\{(40,0), (30,2), (20,4), (10,6)\}$ yes
(d) $\{(20,2), (10,0), (40,4)\}$ NO, input 30 has no output

#2. Determine if each equation represents y as a function of x.

(a) $16x - y^4 = 0$ $\boxed{\text{not a function}}$
$y^4 = 16x$
$y = \pm\sqrt[4]{16x} = \pm 2\sqrt[4]{x}$

(b) $y = \sqrt{1-x}$ $\boxed{\text{function}}$

#3. Given $f(x) = x^2 + 1$, Find:

(a) $f(2)$
$(2)^2+1$
$4+1$
$\boxed{5}$

(b) $f(-4)$
$(-4)^2+1$
$16+1$
$\boxed{17}$

(c) $f(t^2)$
$(t^2)^2+1$
$\boxed{t^4+1}$

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

#4. Determine the domain of each function.

(a) $f(x) = (x-1)(x+2)$
$\boxed{\text{all reals}}$

(b) $f(x) = \sqrt{25-x^2}$
$25 - x^2 \geq 0$
$-x^2 \geq -25$
$x^2 \leq 25$
$|x| \leq 5$
$\boxed{-5 \leq x \leq 5}$

(c) $g(s) = \dfrac{5}{3s-9}$
$3s - 9 \neq 0$
$3s \neq 9$
$\boxed{s \neq 3}$

#5. A company produces a product for which the variable cost is \$5.35 per unit and the fixed costs are \$16,000. The company sells the product for \$8.20 and can sell all that is produces.
(a) Find the total cost as a function of x, the number of units produced.
(b) Find the profit as a function of x.

(a) $\boxed{C(x) = 5.35x + 16000}$

(b) Profit = Sales − cost
$P(x) = 8.20x - (5.35x + 16000)$
$P(x) = 8.20x - 5.35x - 16000$
$\boxed{P(x) = 2.85x - 16000}$

#6. Find the domain and range of each function.

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

$\boxed{\begin{array}{l} D: (-\infty, \infty) \\ R: (-\infty, 3] \end{array}}$

(b) $h(x) = \sqrt{36 - x^2}$

$36 - x^2 \geq 0$

$-x^2 \geq -36$

$x^2 \leq 36$

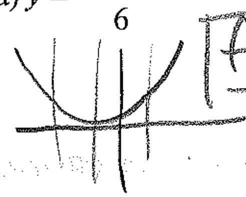
$|x| \leq 6$

$-6 \leq x \leq 6$

$\boxed{\begin{array}{l} D: [-6, 6] \\ R: [0, 6] \end{array}}$

#7. Graph each with a calculator and use the vertical line test to determine whether y is a function of x.

(a) $y = \dfrac{x^2 + 3x}{6}$



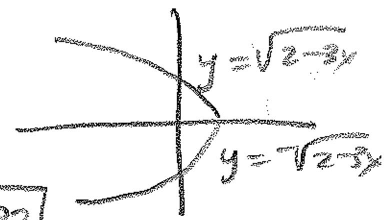
$\boxed{\text{function}}$

(b) $3x + y^2 = 2$

$y^2 = 2 - 3x$

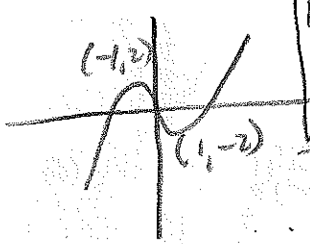
$y = \pm\sqrt{2 - 3x}$

$\boxed{\text{not a function}}$



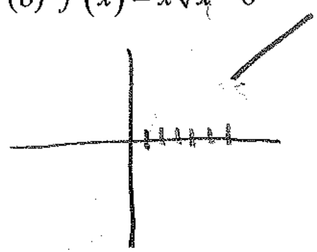
#8. For each function, determine the open intervals over which the function is increasing, decreasing, or constant.

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



$\boxed{\begin{array}{l} \text{incr: } (-\infty, -1) \cup (1, \infty) \\ \text{decr: } (-1, 1) \\ \text{const: nowhere} \end{array}}$

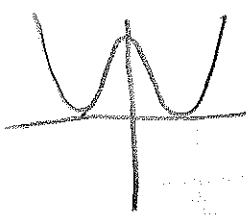
(b) $f(x) = x\sqrt{x - 6}$



$\boxed{\begin{array}{l} \text{incr: } [6, \infty) \\ \text{decr: nowhere} \\ \text{const: nowhere} \end{array}}$

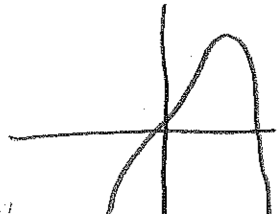
#9. For each function, use a graphing calculator to approximate (to two decimal places) any relative minimum or maximum values.

(a) $f(x) = (x^2 - 4)^2$



$\boxed{\begin{array}{l} \text{min: } (-2.00, 0.00) \\ \qquad (2.00, 0.00) \\ \text{max: } (0.00, 16.00) \end{array}}$

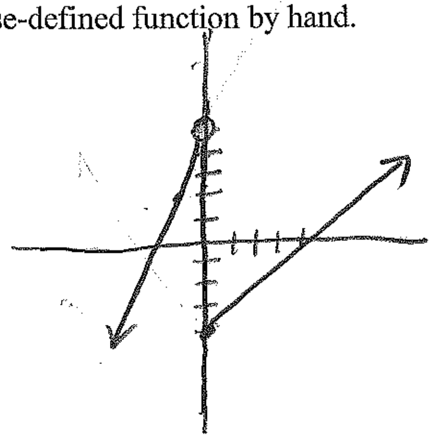
(b) $h(x) = 4x^3 - x^4$



$\boxed{\text{max: } (3, 27)}$

#10. Sketch the graph of the piecewise-defined function by hand.

$$f(x) = \begin{cases} 3x + 5, & x < 0 \\ x - 4, & x \geq 0 \end{cases}$$



#11. Determine whether the function is even, odd, or neither.

$f(x)=(x^2-8)^2$

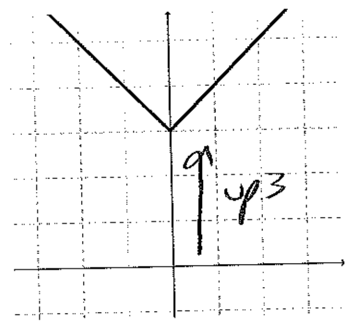
$f(-x)=((-x)^2-8)^2$

$f(-x)=(x^2-8)^2$

$f(-x)=f(x)$ $\boxed{\text{even}}$

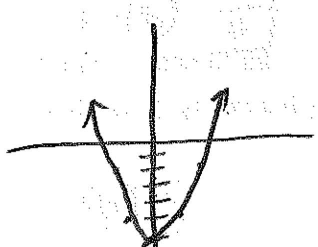
#12. Identify the common function, describe the transformation(s) to the graph shown. Then write the equation for the graphed function:

$\boxed{f(x)=|x|+3}$



#13. Sketch the graphs of the following functions:

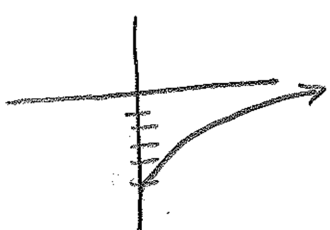
(a) $f(x)=x^2-6$ down6



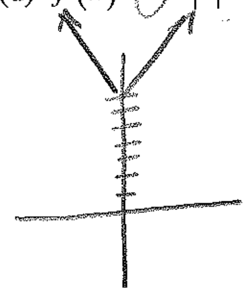
(b) $f(x)=(x-1)^3+7$ up7

r+1

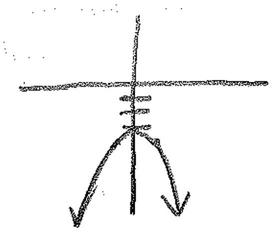
(c) $f(x)=\sqrt{x}-5$ down5



(d) $f(x)=7+|x|$ up7



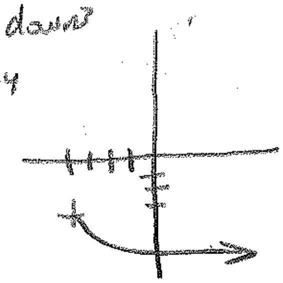
(e) $f(x)=-x^2-3$ vert flip down3



(f) $f(x)=-\sqrt{x+4}-3$ down3

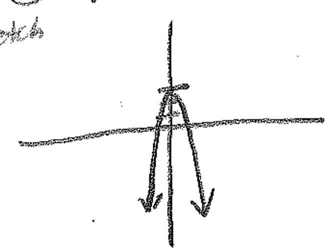
vert flip

left4



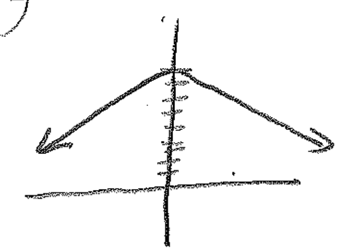
(g) $f(x)=-2x^2+3$ up 3

vert flip, stretch



(h) $f(x)=-\frac{1}{2}|x|+9$ up 9

vert flip, flatten



#14. Given $f(x)=3-2x,\quad g(x)=\sqrt{x},\quad and \quad h(x)=3x^2+2$ find each of the following:

(a) $(f-g)(4) = f(4)-g(4)$

$3-2(4)-\sqrt{4}$

$3-8-2$

$\boxed{-7}$

(b) $(fh)(1) = f(1)\cdot h(1)$

$[3-2(1)][3(1)^2+2]$

$[1][5]$

$\boxed{5}$

(c) $(h\circ g)(7) = h(g(7))$

$h(\sqrt{7})$

$3(\sqrt{7})^2+2$

$3\cdot 7+2$

$21+2 = \boxed{23}$

#15. Find the inverse of each function. Then verify that $f\left(f^{-1}(x)\right)=x \quad and \quad f^{-1}\left(f(x)\right)=x$

(a) $f(x)=6x$

$y=6x$

$x=6y$

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

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

$f(f^{-1}(x))$: $6\left(\frac{x}{6}\right)$, x ✓

$f^{-1}(f(x))$: $\frac{(6x)}{6}$, x ✓

(b) $f(x)=x-7$

$y=x-7$

$x=y-7$

$y=x+7$

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

$f(f^{-1}(x))$: $(x+7)-7$, x ✓

$f^{-1}(f(x))$: $(x-7)+7$, x ✓

#16. Find the inverse of each function. On your calculator, graph both f *and* f^{-1} on the same viewing window, and verify graphically that the functions are inverses.

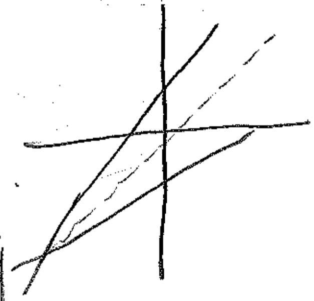
(a) $f(x)=\frac{1}{2}x-3$

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

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

$y=2x+6$

$\boxed{f^{-1}(x)=2x+6}$



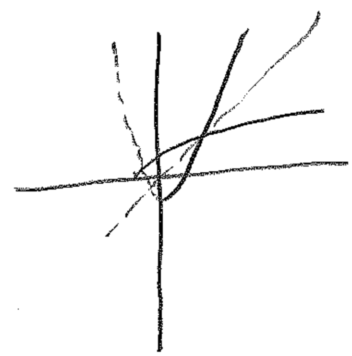
(b) $f(x)=\sqrt{x+1}$

$x=\sqrt{y+1}$

$x^2=y+1$

$y=x^2-1$

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



#17. Find the inverse of each function algebraically.

(a) $f(x)=\frac{x}{12}$

$x=\frac{y}{12}$

$y=12x$

$\boxed{f^{-1}(x)=12x}$

(b) $f(x)=4x^3-3$

$x=4y^3-3$

$4y^3=x+3$

$y^3=\frac{x+3}{4}$

$y=\sqrt[3]{\frac{x+3}{4}}$

$\boxed{f^{-1}(x)=\sqrt[3]{\frac{x+3}{4}}}$

(c) $f(x)=\sqrt{x+10}$

$x=\sqrt{y+10}$

$x^2=y+10$

$y=x^2-10$

$\boxed{f^{-1}(x)=x^2-10}$

but

$x+10\geq 0$

$x\geq -10$

$D_f: [-10,\infty)$

$R_f: [0,\infty)$

So:

$D_{f^{-1}}: [0,\infty)$

$R_{f^{-1}}: [-10,\infty)$

$\boxed{\text{only for } x\geq 0}$

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Period: _____

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(b) $\{(10,4),(20,4),(30,4),(40,4)\}$
(c) $\{(40,0),(30,2),(20,4),(10,6)\}$
(d) $\{(20,2),(10,0),(40,4)\}$

#2. Determine if each equation represents y as a function of x.

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(b) $f(-4)$

(c) $f(t^2)$

(d) $-f(x)$

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(c) $g(s)=\dfrac{5}{3s-9}$

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$$f(x) = \left(x^2 - 8\right)^2$$

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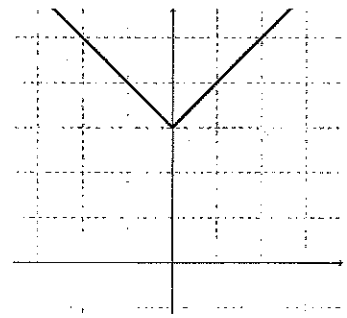

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(e) $f(x) = -x^2 - 3$

(b) $f(x) = (x-1)^3 + 7$

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

(c) $f(x) = \sqrt{x} - 5$

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

(d) $f(x) = 7 + |x|$

(h) $f(x) = -\frac{1}{2}|x| + 9$

#14. Given $f(x)=3-2x,\quad g(x)=\sqrt{x},\quad and\quad h(x)=3x^2+2$ find each of the following:

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(b) $(fh)(1)$

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#17. Find the inverse of each function algebraically.

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(b) $f(x)=4x^3-3$

(c) $f(x)=\sqrt{x+10}$