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

$\boxed{(-\infty, \infty)}$ or all real numbers

(b) $f(x) = \sqrt{25 - x^2}$

$25 - x^2 \geq 0$

$-x^2 \geq -25$

$x^2 \leq 25$

$|x| \leq 5$

$\boxed{[-5, 5]}$

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

$3s - 9 \neq 0$

$3s \neq 9$

$\boxed{\mathbb{R}, s \neq 3}$

#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) $C(x) = 5.35x + 16000$

(b) profit = sales − cost

$P(x) = 8.20x - [5.35x + 16000]$

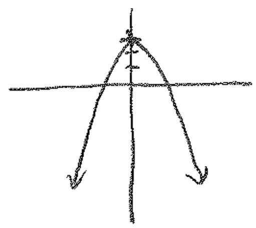
$P(x) = 8.20x - 5.35x - 16000$

$\boxed{P(x) = 2.85x - 16000}$

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

$36 - x^2 \geq 0$
$-x^2 \geq -36$
$x^2 \leq 36$
$|x| \leq 6$
$-6 \leq x \leq 6$

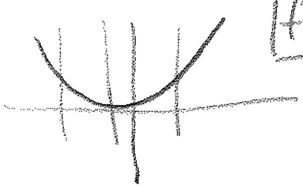
$\boxed{\begin{array}{l} D: [-6, 6] \\ R: [0, 6] \end{array}}$

(range found by calculator graph)

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

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

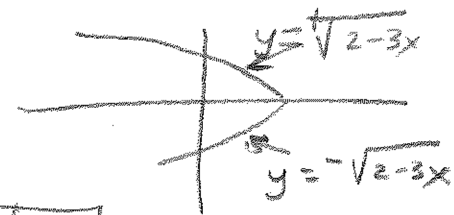
$\boxed{\text{function}}$



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

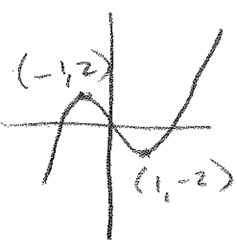
$y^2 = 2 - 3x$
$y = \pm\sqrt{2 - 3x}$

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



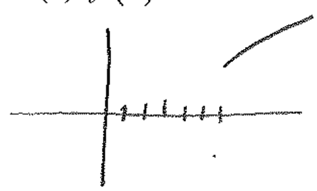
#8. For each function, determine the open intervals over which the function is increasing, decreasing, or constant.

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



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

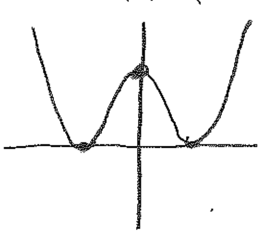
(b) $f(x) = x\sqrt{x - 6}$



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

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

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



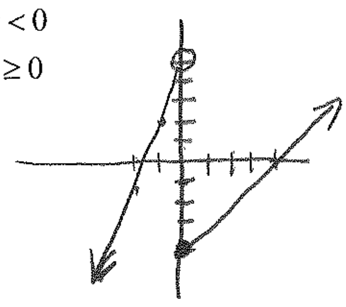
$\boxed{\begin{array}{l} \text{min: } (-2.00, 0.00) \\ \quad\quad (2.00, 0.00) \\ \text{max: } (0.00, 16.00) \end{array}}$

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

$\boxed{\begin{array}{l} \text{max: } (3, 27) \\ \text{no relative min} \end{array}}$

#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.

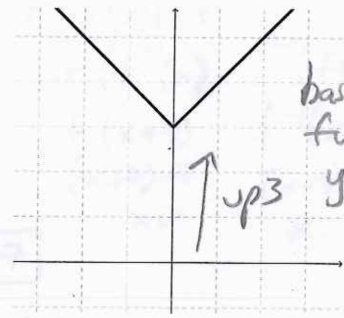
$f(x) = (x^2 - 8)^2$

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

$\boxed{\text{even}}$

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

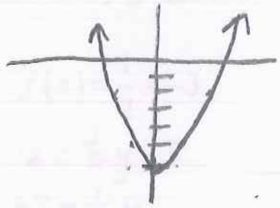
$\boxed{f(x) = |x| + 3}$



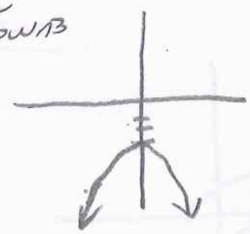
basic function; $y = |x|$

#13. Sketch the graphs of the following functions:

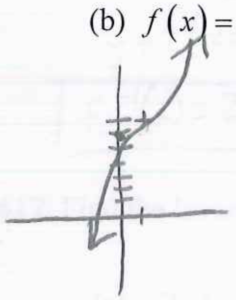
(a) $f(x) = x^2 - 6$ down 6



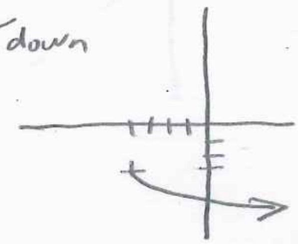
(e) $f(x) = -x^2 - 3$ vertical flip, down 3



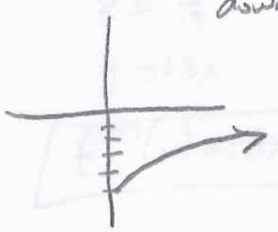
(b) $f(x) = (x-1)^3 + 7$ right 1, up 7



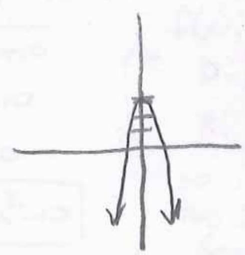
(f) $f(x) = -\sqrt{x+4} - 3$ vert. flip, left 4, down



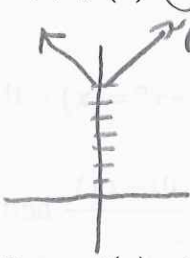
(c) $f(x) = \sqrt{x} - 5$ down 5



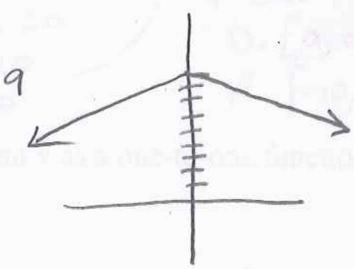
(g) $f(x) = -2x^2 + 3$ vert flip, stretch, up 3



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



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



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

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

$f(4) - g(4)$

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

$-5 - 2$

$\boxed{-7}$

(b) $(fh)(1)$

$f(1) \cdot h(1)$

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

$[1] \cdot [5]$

$\boxed{5}$

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

$h(g(7))$

$h(\sqrt{7})$

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

$21 + 2$

$\boxed{23}$

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

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

$y=6x$

swap x,y: $x=6y$

resolve for y: $\frac{x}{6}=\frac{6y}{6}$

$y=\frac{1}{6}x$

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

$f(f^{-1}(x))$ | $f(\frac{1}{6}x)$ | $6(\frac{1}{6}x)$ | x ✓

$f^{-1}(f(x))$ | $f^{-1}(6x)$ | $\frac{1}{6}(6x)$ | x ✓

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

$y=x-7$

$x=y-7$

$y=x+7$

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

$f(f^{-1}(x))$ | $f(x+7)$ | $(x+7)-7$ | x ✓

$f^{-1}(f(x))$ | $f^{-1}(x-7)$ | $(x-7)+7$ | 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.

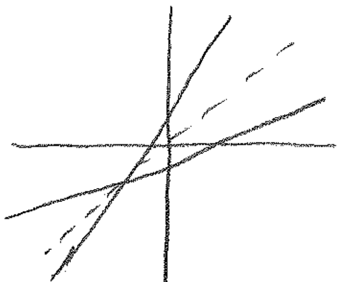
(a) $f(x)=\frac{1}{2}x-3$

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

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

$y=2(x+3)$

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



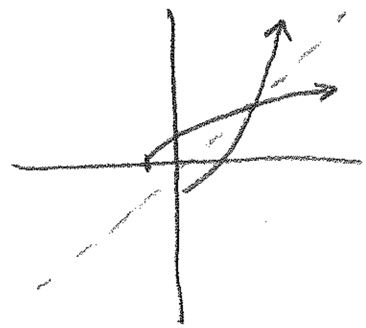
(b) $f(x)=\sqrt{x+1}$

$x=\sqrt{y+1}$

$x^2=y+1$

$y=x^2-1$

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



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

$x=4y^3-3$

$x+3=4y^3$

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

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

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

(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 can't have $\sqrt{\text{negative}}$ so

$x+10\geq 0$

$x\geq -10$

$f(x)$:

D: $[-10,\infty)$

R: $[0,\infty)$

so inverse has Domain/Range swapped:

$f^{-1}(x)$:

D: $[0,\infty)$

R: $[-10,\infty)$

#18. If $f(x)=2x+3$,

find $\frac{f(x-10)-f(10)}{x}$, *where* $x\neq 0$

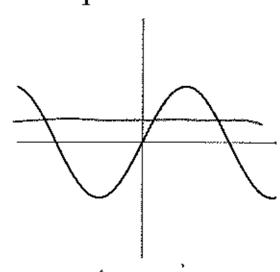
$\frac{[2(x-10)+3]-[2(10)+3]}{x}$

$\frac{[2x-20+3]-[23]}{x}$

$\frac{2x-17-23}{x}$

$\boxed{\frac{2x-40}{x}}$

#19. Does the graph represent y as a one-to-one function of x? Explain.



No, fails the Horizontal Line Test (more than one input for some outputs)

Honors Algebra 3-4
Ch 1 Review worksheet

Name: ______________________________

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(b) $f(-4)$

(c) $f(t^2)$

(d) $-f(x)$

#4. Determine the domain of each function.

(a) $f(x) = (x-1)(x+2)$

(b) $f(x) = \sqrt{25 - x^2}$

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

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(a) Find the total cost as a function of x, the number of units produced.
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#6. Find the domain and range of each function.

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

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

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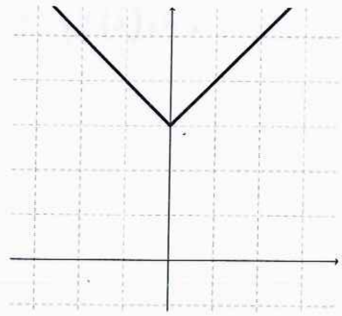

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(e) $f(x) = -x^2 - 3$

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

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#17. Find the inverse of each function algebraically.

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

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

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

#18. If $f(x)=2x+3$,

find $\frac{f(x-10)-f(10)}{x}$, *where* $x\neq 0$

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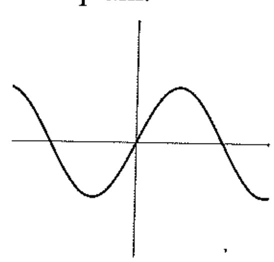

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