Algebra III
Chapter 4
Review B

Name Key

Period _____ Date _____

Determine whether the graph has symmetry to the
(a) x-axis (b) y-axis (c) line y = x (d) origin

$y \to -y$ $x \to -x$ $x \rightleftarrows y$ $x \to -x$ $y \to -y$

1) $x^2 - y^2 = 11$

a) $x^2 - (-y)^2 = 11$ $x^2 - y^2 = 11$ yes

b) $(-x)^2 - y^2 = 11$ $x^2 - y^2 = 11$ yes

c) $y^2 - x^2 = 11$ NO

d) $(-x)^2 - (-y)^2 = 11$ $x^2 - y^2 = 11$ yes

2) $x^3 + y^3 = 8$

a) $x^3 + (-y)^3 = 8$ $x^3 - y^3 = 8$ NO

b) $(-x)^3 + y^3 = 8$ $-x^3 + y^3 = 8$ NO

c) $y^3 + x^3 = 8$ yes

d) $(-x)^3 + (-y)^3 = 8$ $-x^3 - y^3 = 8$ $x^3 + y^3 = -8$ NO

Give the domain of each function.

3) $h(x) = \dfrac{x-1}{x^2 - 4x + 3} \neq 0$

$(x-3)(x-1)$

$x = 3 \quad x = 1$

D: $\{x \mid \mathbb{R}\ x \neq 3, 1\}$

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

$f(x) = \frac{x-5}{4+x}$ $\{x \mid \mathbb{R}, x \neq -4\}$

$x^2 - 4 \geq 0$

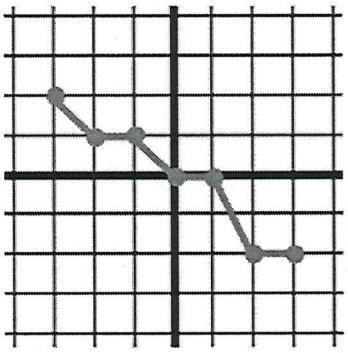
$(x-2)(x+2) \geq 0$

$x = 2 \quad x = -2$

Test intervals: -2, 2

D: $\{x \mid x \geq 2 \text{ or } x \leq -2\}$

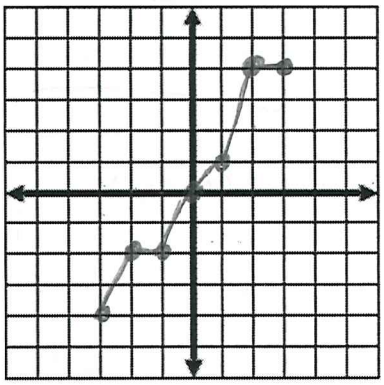
5) Given the graph y = f(x), sketch the graph of each of the following ...



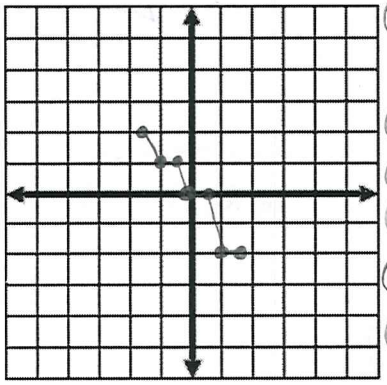
f(x)
(−3, 2)
(−2, 1)
(−1, 1)
(0, 0)
(1, 0)
(2, −2)
(3, −2)

a) y = −2f(x) $(x, -2 \cdot y)$

(−3, −4)
(−2, −2)
(−1, −2)
(0, 0)
(1, 0)
(2, 4)
(3, 4)

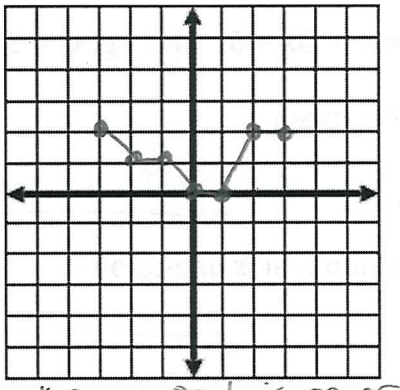


b) y = f(2x) $(\frac{x}{2}, y)$



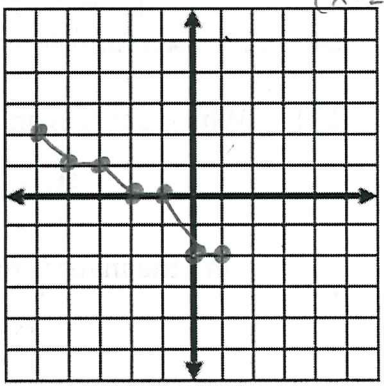
$(-3/2, 2)$
$(-1, 1)$
$(-1/2, 1)$
$(0, 0)$
$(1/2, 0)$
$(1, -2)$
$(3/2, -2)$

c) y = $|f(x)|$ $(x, |y|)$



* copy what is on or above the x-axis

d) y = f(x + 2) 2 left $(x-2, y)$



Domain of: Linear, quadratic, cubic, abs value ⇒ $\mathbb{R}$ (x, x^2, x^3, |x|)

Range of: $\mathbb{R}$, look @ vertex, $\mathbb{R}$, look @ vertex

Graph the function and give the domain, range, and zeros.

6) $f(x) = x^2 + 6x + 5$ $(x+5)(x+1) = 0$ ($x=-5$, $x=-1$)

Vertex: $\frac{-b}{2a} = \frac{-6}{2(1)} = \frac{-6}{2} = -3$

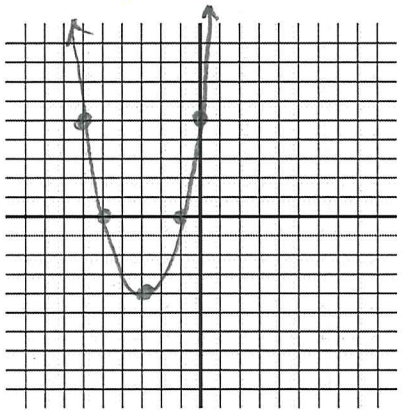
$(-3, -4)$

$(-3)^2 + 6(-3) + 5$

$9 - 18 + 5 = -4$

D: $\{x \mid \mathbb{R}\}$ R: $\{y \mid y \geq -4\}$

Zeros: $x = -5$ $x = -1$



7) $f(x) = \frac{3}{4}x - 2$

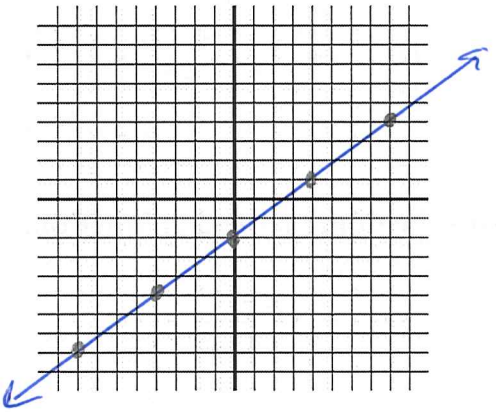
Zero: $\frac{3}{4}x - 2 = 0$

$\frac{4}{3}\left(\frac{3}{4}x\right) = (2)\frac{4}{3}$

$x = \frac{8}{3}$

D: $\{x \mid \mathbb{R}\}$ R: $\{y \mid \mathbb{R}\}$

Zeros: $x = 8/3$ or $2\frac{2}{3}$



Let $f(x) = 2x - 1$, $g(x) = x + 1$, and $h(x) = x^2 + 2x$. Find each of the following.

8) $(f + h)(x)$

$(2x-1) + (x^2+2x)$

$x^2 + 4x - 1$

9) $(f - g)(x)$

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

$2x - 1 - x - 1$

$x - 2$

10) $h(g(f(3)))$

$f(3) = 2(3) - 1 = 5$

$g(5) = 5 + 1 = 6$

$h(6) = 6^2 + 2(6) = 36 + 12$

$= 48$

11) $(f \circ g)(x)$

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

$2x + 2 - 1$

$2x + 1$

12) $(f \circ h)(2)$

$h(2) = (2)^2 + 2(2) = 8$

$f(8) = 2(8) - 1 = 15$

13) $g(f(x))$

$g(2x-1)$

$(2x-1) + 1$

$= 2x$

Given the two functions $f(x) = x^2 - 5x + 6$ and $g(x) = 5 + x$

14) Which one has an inverse? Explain.

$g(x)$, passes VLT & HLT

(Quadratics do NOT have inverses)

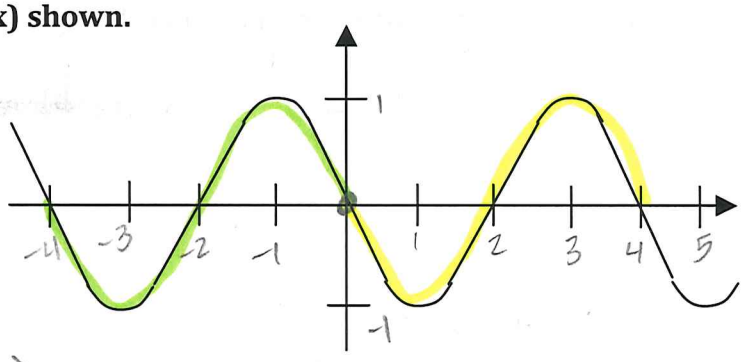
15) Find the inverse of the function that is one-to-one.

$x = 5 + y$

$y = x - 5$

$g^{-1}(x) = x - 5$

Use the graph of the periodic function f(x) shown.



16) What is the period?

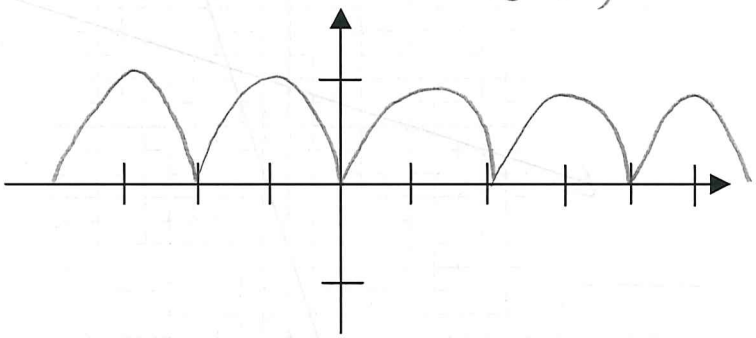
(repeats every 4 units) $4 = P$

17) What is the amplitude?

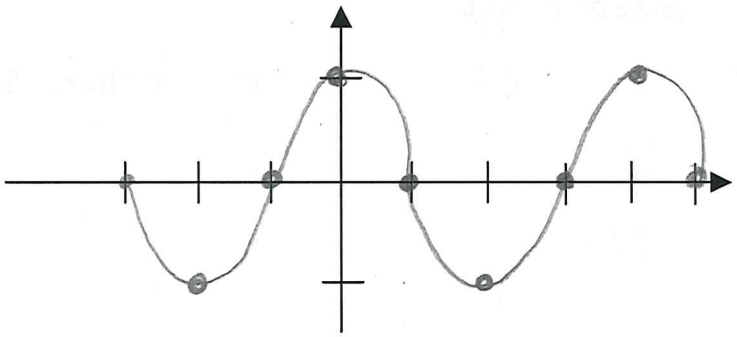
$\frac{\text{Max-min}}{2} = \frac{1-(-1)}{2} = \frac{2}{2} = 1 = A$

18) Sketch the graph of $y = |f(x)|$.

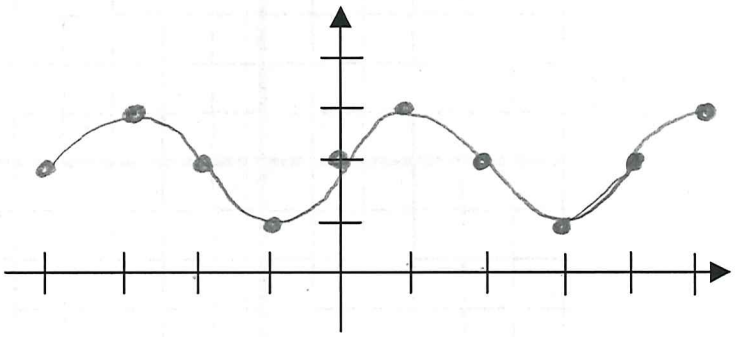
$(x, |y|)$



19) Sketch the graph of $y = f(x-1)$ * 1 to right $(x+1, y)$



20) Sketch the graph of $y = f(-x) + 2$ reflects over y-axis $(\frac{x}{-1}, y+2)$



f(x)	New
(-3, -1)	(3, 1)
(-2, 0)	(2, 2)
(-1, 1)	(1, 3)
(0, 0)	(0, 2)
(1, -1)	(-1, 1)
(2, 0)	(-2, 2)
(3, 1)	(-3, 3)
(4, 0)	(-4, 2)

f(x) : original
(3, -4) (1, 5)

f⁻¹(x) : inverse
(-4, 3) (5, 1)

21) Suppose function f(x) has an inverse. If f(3) = -4 and f(1) = 5 find:

a) $f^{-1}(-4) =$ 3

(-4, 3)

b) $f(f^{-1}(5)) =$ 5

(5, 1)

22) Given f(x) = 3x – 5.

a) Graph f(x) and $f^{-1}(x)$.

b) Then find a rule for $f^{-1}(x)$.

find the equation of the inverse

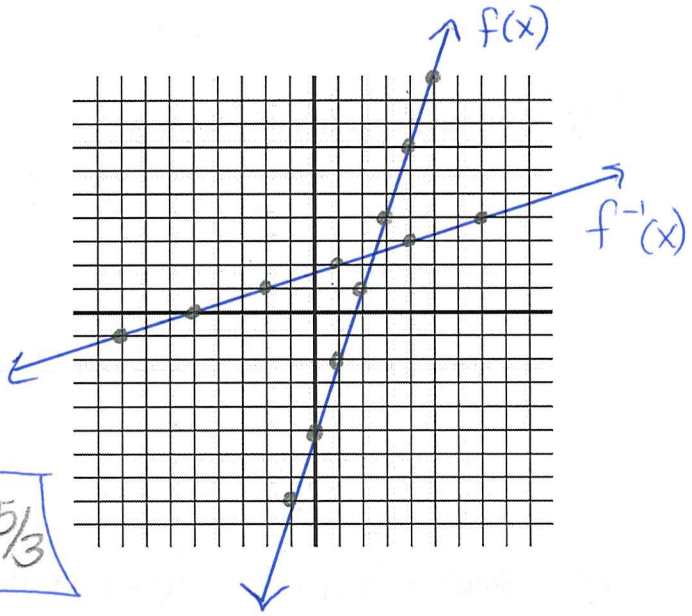
① $y = 3x - 5$

$x = 3y - 5$

$\frac{x+5}{3} = \frac{3y}{3}$

② $y = \frac{1}{3}x + \frac{5}{3}$

③ $f^{-1}(x) = \frac{1}{3}x + \frac{5}{3}$



23) Describe the transformations that take place on y = f(x).

a) y = -4f(x)

Vertically Stretch by 4 & reflect over x-axis

b) y = f(x – 3) + 7

Shift right 3 units and up 7 units

c) y = f(2x) – 5

horizontal shrink by 1/2 and

24) Draw a graph that is periodic. Explain why your graph is periodic.

Answer will vary (graph)

Explain: graph repeats every 4 units