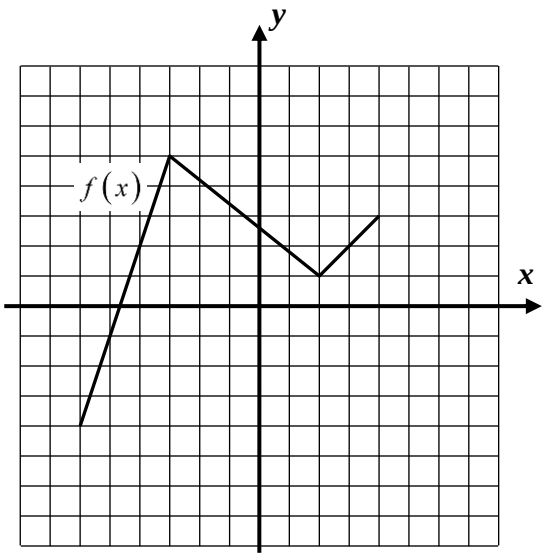
Name: _____ Date: _____

SHIFTING FUNCTIONS
MATH III HOMEWORK

FLUENCY

1. Given the function $f(x)$ shown graphed on the grid, create a graph for each of the following functions and label on the grid.



(a) $g(x) = f(x) + 2$

(b) $h(x) = f(x-3)$

(c) $k(x) = f(x+1) - 4$

2. If the quadratic function $f(x)$ has a turning point at $(-3, 7)$ then where does the quadratic function *g* defined by $g(x) = f(x+4) + 5$ have a turning point?

(1) $(-7, 12)$ (3) $(-4, 5)$

(2) $(1, 12)$ (4) $(4, 5)$ _____

3. Over which of the following intervals would the function $h(x) = |x-2| + 6$ be decreasing only? Sketch a graph of the function if needed.

(1) $x > 2$ (3) $x < 6$

(2) $x < 2$ (4) $x > 6$ _____

4. If the domain of $f(x)$ is $-3 \le x \le 9$ and the range of $f(x)$ is $2 \le y \le 15$, then which of the following statements is correct about the domain and range of $g(x) = f(x-2) - 8$?

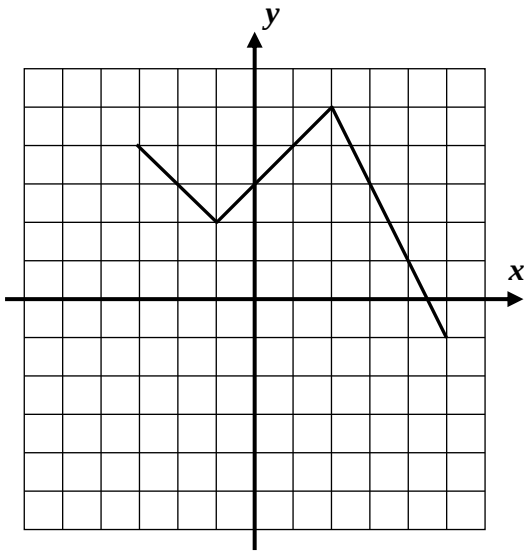
(1) Its domain is $-1 \le x \le 11$ and its range is $10 \le y \le 23$.

(2) Its domain is $-5 \le x \le 7$ and its range is $-6 \le y \le 7$.

(3) Its domain is $-1 \le x \le 11$ and its range is $-6 \le y \le 7$.

(4) Its domain is $-5 \le x \le 7$ and its range is $10 \le y \le 23$. _____

5. The graph of the function $f(x)$ is shown on the grid below. The function *g* is defined by the formula $g(x) = f(x+3) - 1$.



(a) Graph and label *g* on the axes along with *f*.

(b) What is the smallest solution to the equation $f(x) = g(x)$?

(c) If $h(x) = g(x) - 3$, explain why the equation $h(x) = f(x)$ has no solutions.

APPLICATIONS

6. A projectile has a height given by the function $h(t) = -4.9(t-4)^2 + 153$, where times, *t*, is in seconds and the height, *h*, is in meters. What is the maximum height of the function and at what time does it reach that height?

REASONING

7. Given the linear equations $f(x) = 2x$ and $g(x) = 2x - 2$ answer the following.

(a) Show that the function *f* passes through the origin.

(b) How has the function *f* been shifted to produce the function *g*?

(c) Write the function *g* in factored form.

(d) Based on (c), how has the function *f* been shifted to produce the function *g*?

(e) How would $f(x)$ need to be shifted to produce $h(x) = 2(x+5) - 7$? Given that *f* must contain the point $(0, 0)$, what point must $h(x)$ contain based on the shifting?