

Name _____ Date _____ Period _____

Worksheet 2.4—Parent Functions & Transformations

Show all work on a separate sheet of paper. Give simplified, exact values for all answers. **No Calculator is Permitted unless specifically stated.**

I. Multiple Choice

_____ 1. Give a function f , which of the following represents a horizontal stretch by a factor of 3?

- (A) $y = f(3x)$ (B) $y = f\left(\frac{1}{3}x\right)$ (C) $y = 3f(x)$ (D) $y = \frac{1}{3}f(x)$ (E) $y = f(x) + 3$

_____ 2. Give a function f , which of the following represents a vertical compression by a factor of 3?

- (A) $y = f(3x)$ (B) $y = f\left(\frac{1}{3}x\right)$ (C) $y = 3f(x)$ (D) $y = \frac{1}{3}f(x)$ (E) $y = f(x) + 3$

_____ 3. Give a function f , which of the following represents a horizontal shift 3 units right?

- (A) $y = f(x-3)$ (B) $y = f(x+3)$ (C) $y = 3 + f(x)$ (D) $y = f(x) - 3$ (E) $y = f(3x)$

_____ 4. Give a function f , which of the following represents a vertical shift 4 units up FOLLOWED BY a reflection across the x -axis??

- (A) $y = -f(x) - 4$ (B) $y = -f(x) + 4$ (C) $y = f(4-x)$ (D) $y = f(x-4)$ (E) $y = -f(x-4)$

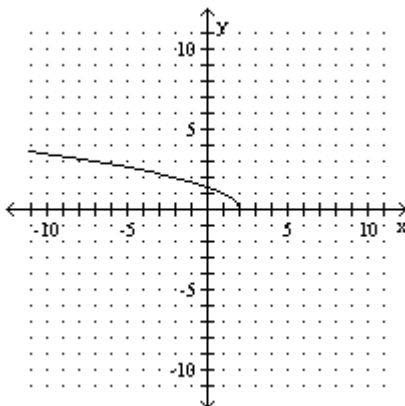
_____ 5. If $f(x) = 2 + \ln\left(3x - \frac{\pi}{2}\right)$, then compared to the parent function $y = \ln x$, the graph of f is shifted

- (A) $\pi/2$ units right (B) $\pi/6$ units right (C) 2 units left (D) 3 units left (E) $\pi/2$ units left

_____ 6. The average rate of change for $f(x) = 1 + \sqrt{x}$ on the interval $[1, 4]$ is

- (A) $1/3$ (B) $1/2$ (C) 0 (D) $2/3$ (E) $3/2$

_____ 7. The graph of a function $f(x)$ is given below. What is the equation of this graph?



- (A) $f(x) = \sqrt{-x} + 2$ (B) $f(x) = -\sqrt{x} + 2$ (C) $f(x) = -\sqrt{x+2}$
 (D) $f(x) = \sqrt{-x-2}$ (E) $f(x) = \sqrt{-x+2}$

II. Short Answer

8. Find the domain of each function, put each of the following in standard transformation form, then sketch the graph showing important information. Compare your algebraic domain to the domain of your graph.

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

(b) $f(x) = \frac{1}{2}\sqrt{8x+4} - 3$

(c) $f(x) = 2 - \frac{3}{2x-5}$

(d) $f(x) = \frac{3}{2}e^{\frac{2}{3}x - \frac{9}{2}} - 3$

(e) $f(x) = \frac{2x-3}{4x-1}$

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

9. If $g(x) = f(ex)$ is a transformation of a function $y = f(x)$, by algebraically manipulating each function, describe TWO different ways, if possible, to obtain the graph of g from the graph of f by a standard transformation. Note: $e \approx 2.718$.

(a) $f(x) = x$

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

(c) $f(x) = x^3$

(d) $f(x) = \sqrt{x}$

(e) $f(x) = x^{-1}$

(f) $f(x) = |x|$

(g) $f(x) = \ln x$

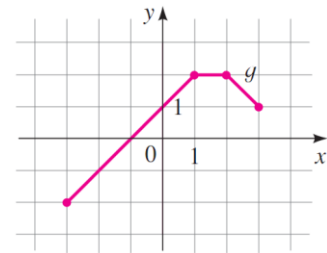
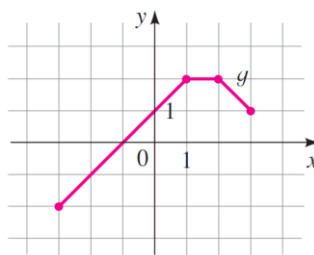
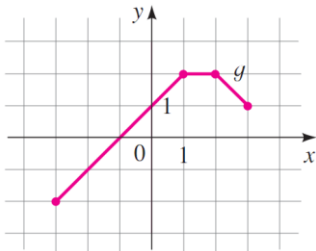
(h) $f(x) = e^x$

The graph of h is given at right. Sketch the graphs of the following functions. Be sure to scale your graphs:

(a) $y = h(x+1)$

(b) $y = -h(x+1)$

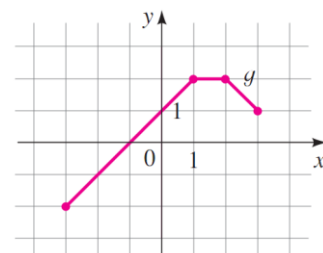
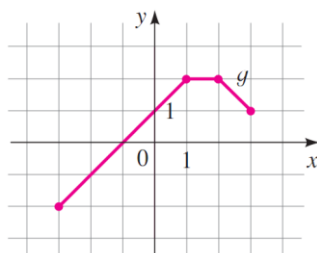
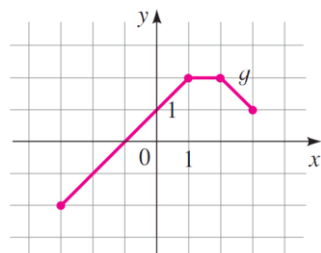
(c) $y = h(x-2) - 1$



(d) $y = -h(x) + 2$

(e) $y = 2h(1-x)$

(f) $y = |h(x)|$



(g) $y = h(|x|)$

(h) $y = |h(|x|)|$

