

## **Final Exam: Review Problems**

- Graph using transformations.
- Operations with functions.
- Composite functions.
- Polynomial functions.
- Rational functions.
- Systems of equations.

1. Match ea

3. Match each graph to one of the following functions.

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

d)  $f(x) = x^2 + 2x + 1$

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

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

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

h)  $f(x) = x^2 + 2x + 2$

c)  $f(x) = x^2 + 2x$

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

A.

$y \uparrow$

B.

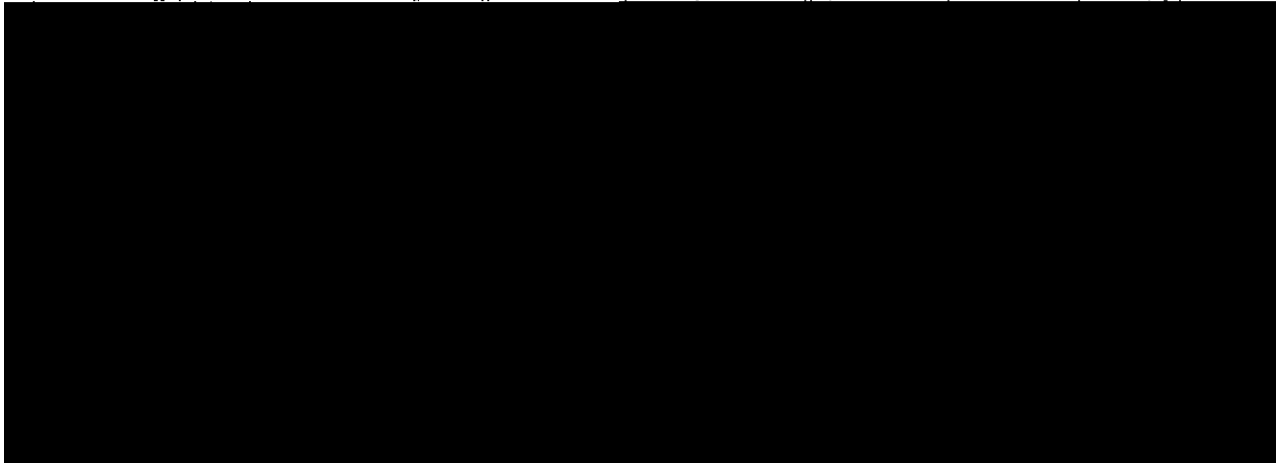
$y \uparrow$

C.

$y \uparrow$

D.

$y \uparrow$



4. Write the function in the form  $f(x) = a(x-h)^2 + k$  and graph it using transformation techniques.

a)  $f(x) = \frac{1}{4}x^2$

d)  $f(x) = 2x^2 - 4x + 1$

b)  $f(x) = \frac{1}{4}x^2 - 2$

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

c)  $f(x) = x^2 + 4x + 2$

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

5. For the given functions  $f$  and  $g$ , find the following functions and state the domain of each.

a)  $f + g$

b)  $f - g$

c)  $f \cdot g$

d)  $\frac{f}{g}$

1)  $f(x) = 3x + 4$ ;  $g(x) = 2x - 3$

4)  $f(x) = 1 + \frac{1}{x}$ ;  $g(x) = \frac{1}{x}$

2)  $f(x) = x - 1$ ;  $g(x) = 2x^2$

3)  $f(x) = \sqrt{x}$ ;  $g(x) = 3x - 5$

5)  $f(x) = \frac{2x+3}{3x-2}$ ;  $g(x) = \frac{4x}{3x-2}$

6. For the given functions  $f$  and  $g$ , find

a)  $f \circ g$

b)  $g \circ f$

c)  $f \circ f$

d)  $g \circ g$

State the domain of each composite function.

1)  $f(x) = 2x + 3$ ;  $g(x) = 3x$

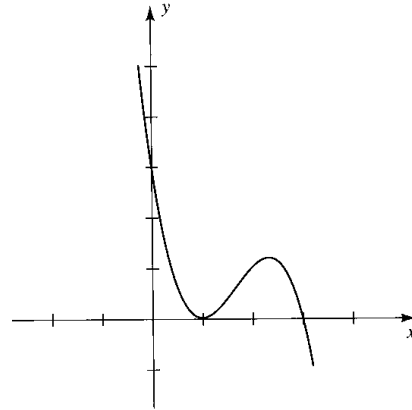
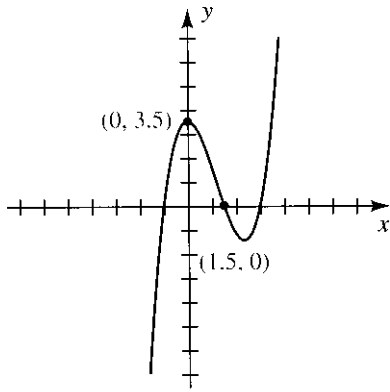
2)  $f(x) = 3x + 1$ ;  $g(x) = x^2$

3)  $f(x) = x^2$ ;  $g(x) = x^2 + 4$

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

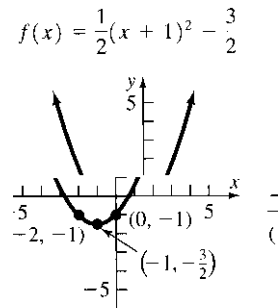
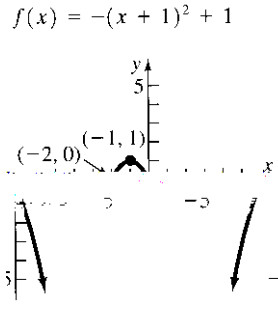
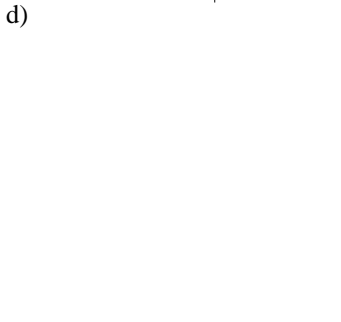
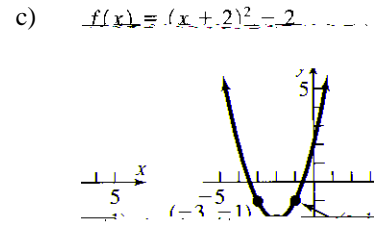
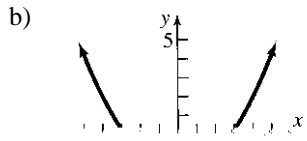
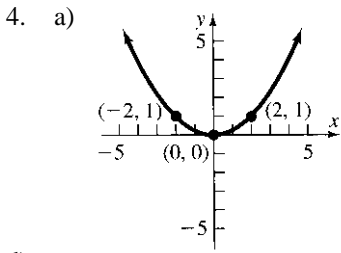
7. Form a polynomial whose zeros and degree are given.

- a) Zeros: -1, 2, 3; degree 3
- b) Zeros: 4, 3, 0; degree 3
- c) -4 and 3 are zeros of multiplicity 2; degree 4
- d) -



# ANSWERS

- Use the previously downloaded (wzgrapher\_e) to check your answers.
- Use the previously downloaded (wzgrapher\_e) to check your answers.
- Use the previously downloaded (wzgrapher\_e) to check your answers.



numbers (a)  $(f+g)(x) = 2x^2 + x - 1$ ; All real numbers (b)  $(f-g)(x) = -2x^2 + x - 1$ ; All real nu

(c)  $(f \cdot g)(x) = 2x^3 - 2x^2$ ; All real numbers (d)  $\left(\frac{f}{g}\right)(x) = \frac{x-1}{x}$ ;  $\{x|x \neq 0\}$

(a)  $(f+g)(x) = \sqrt{x} + 3x - 5$ ;  $\{x|x \geq 0\}$  (b)  $(f-g)(x) = \sqrt{x} - 3x + 5$ ;  $\{x|x \geq 0\}$

(c)  $(f \cdot g)(x) = 3x\sqrt{x} - 5\sqrt{x}$ ;  $\{x|x \geq 0\}$  (d)  $\left(\frac{f}{g}\right)(x) = \frac{\sqrt{x}}{2x-5}$ ;  $\{x|x \geq 0, x \neq \frac{5}{2}\}$

(a)  $(f+g)(x) = 1 + \frac{2}{x}$ ;  $\{x|x \neq 0\}$  (b)  $(f-g)(x) = 1 - \frac{2}{x}$ ;  $\{x|x \neq 0\}$  (c)  $(f \cdot g)(x) = \frac{1}{x}$ ;  $\{x|x \neq 0\}$  (d)  $\left(\frac{f}{g}\right)(x) = \frac{1}{1-x}$ ;  $\{x|x \neq 1\}$

d)  $\left(\frac{f}{g}\right)(x) = x + 1$ ;  $\{x|x \neq 0\}$

(a)  $(f+g)(x) = \frac{6x+3}{3x-2}$ ;  $\{x|x \neq \frac{2}{3}\}$  (b)  $(f-g)(x) = \frac{-2x+3}{3x-2}$ ;  $\{x|x \neq \frac{2}{3}\}$

$\cdot g)(x) = \frac{8x^2+12x}{(3x-2)^2}$ ;  $\{x|x \neq \frac{2}{3}\}$  (d)  $\left(\frac{f}{g}\right)(x) = \frac{2x+3}{4x}$ ;  $\{x|x \neq 0, x \neq \frac{2}{3}\}$  (e)  $(f$

1) (a)  $(f \circ g)(x) = 6x + 3$ ; All real numbers (b)  $(g \circ f)(x) = 6x + 9$ ;

(c)  $(f \circ f)(x) = 9x + 4$ ; All real numbers (d)  $(g \circ g)(x) = x^2$ ; All real numbers (b)  $(g \circ f)(x) = 9x^2 + 6x + 1$ ; All real numbers (c)

(a)  $(f \circ g)(x) = 4 - x$ ; All real numbers (b)  $(g \circ f)(x) = 4 - x$ ; All real numbers (c)  $(f \circ f)(x) = 4 - x$ ; All real numbers (d)  $(g \circ g)(x) = 4 - x$ ; All real numbers

(a)  $(f \circ g)(x) = x$ ;  $\{x|x \geq 1\}$  (b)  $(g \circ f)(x) = 1 - x$ ;  $\{x|x \geq 1\}$  (c)  $(f \circ f)(x) = 1 - x$ ;  $\{x|x \geq 1\}$  (d)  $(g \circ g)(x) = 1 - x$ ;  $\{x|x \geq 1\}$

(a)  $(f \circ g)(x) = x$ ;  $\{x|x \geq 1\}$  (b)  $(g \circ f)(x) = 1 - x$ ;  $\{x|x \geq 1\}$  (c)  $(f \circ f)(x) = 1 - x$ ;  $\{x|x \geq 1\}$  (d)  $(g \circ g)(x) = 1 - x$ ;  $\{x|x \geq 1\}$

(a)  $(f \circ g)(x) = x$ ;  $\{x|x \geq 1\}$  (b)  $(g \circ f)(x) = 1 - x$ ;  $\{x|x \geq 1\}$  (c)  $(f \circ f)(x) = 1 - x$ ;  $\{x|x \geq 1\}$  (d)  $(g \circ g)(x) = 1 - x$ ;  $\{x|x \geq 1\}$

(a)  $(f \circ g)(x) = x$ ;  $\{x|x \geq 1\}$  (b)  $(g \circ f)(x) = 1 - x$ ;  $\{x|x \geq 1\}$  (c)  $(f \circ f)(x) = 1 - x$ ;  $\{x|x \geq 1\}$  (d)  $(g \circ g)(x) = 1 - x$ ;  $\{x|x \geq 1\}$

(a)  $(f \circ g)(x) = x$ ;  $\{x|x \geq 1\}$  (b)  $(g \circ f)(x) = 1 - x$ ;  $\{x|x \geq 1\}$  (c)  $(f \circ f)(x) = 1 - x$ ;  $\{x|x \geq 1\}$  (d)  $(g \circ g)(x) = 1 - x$ ;  $\{x|x \geq 1\}$

(a)  $(f \circ g)(x) = x$ ;  $\{x|x \geq 1\}$  (b)  $(g \circ f)(x) = 1 - x$ ;  $\{x|x \geq 1\}$  (c)  $(f \circ f)(x) = 1 - x$ ;  $\{x|x \geq 1\}$  (d)  $(g \circ g)(x) = 1 - x$ ;  $\{x|x \geq 1\}$

(a)  $(f \circ g)(x) = x$ ;  $\{x|x \geq 1\}$  (b)  $(g \circ f)(x) = 1 - x$ ;  $\{x|x \geq 1\}$  (c)  $(f \circ f)(x) = 1 - x$ ;  $\{x|x \geq 1\}$  (d)  $(g \circ g)(x) = 1 - x$ ;  $\{x|x \geq 1\}$

(a)  $(f \circ g)(x) = x$ ;  $\{x|x \geq 1\}$  (b)  $(g \circ f)(x) = 1 - x$ ;  $\{x|x \geq 1\}$  (c)  $(f \circ f)(x) = 1 - x$ ;  $\{x|x \geq 1\}$  (d)  $(g \circ g)(x) = 1 - x$ ;  $\{x|x \geq 1\}$

(a)  $(f \circ g)(x) = x$ ;  $\{x|x \geq 1\}$  (b)  $(g \circ f)(x) = 1 - x$ ;  $\{x|x \geq 1\}$  (c)  $(f \circ f)(x) = 1 - x$ ;  $\{x|x \geq 1\}$  (d)  $(g \circ g)(x) = 1 - x$ ;  $\{x|x \geq 1\}$

(a)  $(f \circ g)(x) = x$ ;  $\{x|x \geq 1\}$  (b)  $(g \circ f)(x) = 1 - x$ ;  $\{x|x \geq 1\}$  (c)  $(f \circ f)(x) = 1 - x$ ;  $\{x|x \geq 1\}$  (d)  $(g \circ g)(x) = 1 - x$ ;  $\{x|x \geq 1\}$

(a)  $(f \circ g)(x) = x$ ;  $\{x|x \geq 1\}$  (b)  $(g \circ f)(x) = 1 - x$ ;  $\{x|x \geq 1\}$  (c)  $(f \circ f)(x) = 1 - x$ ;  $\{x|x \geq 1\}$  (d)  $(g \circ g)(x) = 1 - x$ ;  $\{x|x \geq 1\}$

(a)  $(f \circ g)(x) = x$ ;  $\{x|x \geq 1\}$  (b)  $(g \circ f)(x) = 1 - x$ ;  $\{x|x \geq 1\}$  (c)  $(f \circ f)(x) = 1 - x$ ;  $\{x|x \geq 1\}$  (d)  $(g \circ g)(x) = 1 - x$ ;  $\{x|x \geq 1\}$

(a)  $(f \circ g)(x) = x$ ;  $\{x|x \geq 1\}$  (b)  $(g \circ f)(x) = 1 - x$ ;  $\{x|x \geq 1\}$  (c)  $(f \circ f)(x) = 1 - x$ ;  $\{x|x \geq 1\}$  (d)  $(g \circ g)(x) = 1 - x$ ;  $\{x|x \geq 1\}$

(a)  $(f \circ g)(x) = x$ ;  $\{x|x \geq 1\}$  (b)  $(g \circ f)(x) = 1 - x$ ;  $\{x|x \geq 1\}$  (c)  $(f \circ f)(x) = 1 - x$ ;  $\{x|x \geq 1\}$  (d)  $(g \circ g)(x) = 1 - x$ ;  $\{x|x \geq 1\}$

(a)  $(f \circ g)(x) = x$ ;  $\{x|x \geq 1\}$  (b)  $(g \circ f)(x) = 1 - x$ ;  $\{x|x \geq 1\}$  (c)  $(f \circ f)(x) = 1 - x$ ;  $\{x|x \geq 1\}$  (d)  $(g \circ g)(x) = 1 - x$ ;  $\{x|x \geq 1\}$

(a)  $(f \circ g)(x) = x$ ;  $\{x|x \geq 1\}$  (b)  $(g \circ f)(x) = 1 - x$ ;  $\{x|x \geq 1\}$  (c)  $(f \circ f)(x) = 1 - x$ ;  $\{x|x \geq 1\}$  (d)  $(g \circ g)(x) = 1 - x$ ;  $\{x|x \geq 1\}$

(a)  $(f \circ g)(x) = x$ ;  $\{x|x \geq 1\}$  (b)  $(g \circ f)(x) = 1 - x$ ;  $\{x|x \geq 1\}$  (c)  $(f \circ f)(x) = 1 - x$ ;  $\{x|x \geq 1\}$  (d)  $(g \circ g)(x) = 1 - x$ ;  $\{x|x \geq 1\}$

(a)  $(f \circ g)(x) = x$ ;  $\{x|x \geq 1\}$  (b)  $(g \circ f)(x) = 1 - x$ ;  $\{x|x \geq 1\}$  (c)  $(f \circ f)(x) = 1 - x$ ;  $\{x|x \geq 1\}$  (d)  $(g \circ g)(x) = 1 - x$ ;  $\{x|x \geq 1\}$

(a)  $(f \circ g)(x) = x$ ;  $\{x|x \geq 1\}$  (b)  $(g \circ f)(x) = 1 - x$ ;  $\{x|x \geq 1\}$  (c)  $(f \circ f)(x) = 1 - x$ ;  $\{x|x \geq 1\}$  (d)  $(g \circ g)(x) = 1 - x$ ;  $\{x|x \geq 1\}$

(a)  $(f \circ g)(x) = x$ ;  $\{x|x \geq 1\}$  (b)  $(g \circ f)(x) = 1 - x$ ;  $\{x|x \geq 1\}$  (c)  $(f \circ f)(x) = 1 - x$ ;  $\{x|x \geq 1\}$  (d)  $(g \circ g)(x) = 1 - x$ ;  $\{x|x \geq 1\}$

8. a)

