

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.

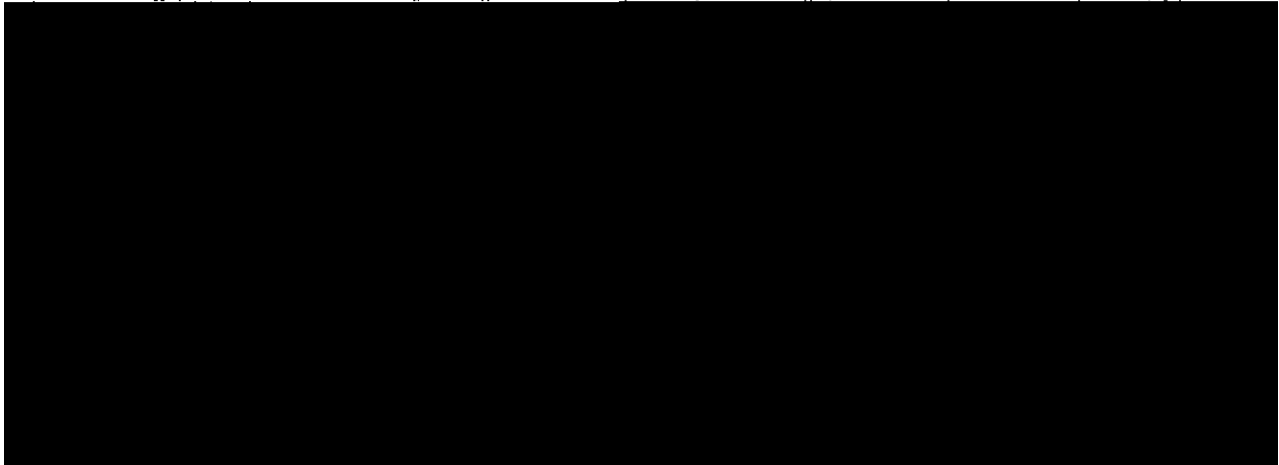
$y \uparrow$

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

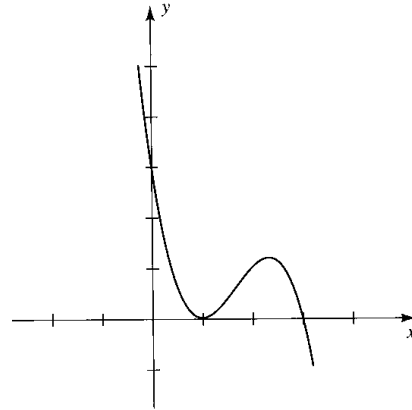
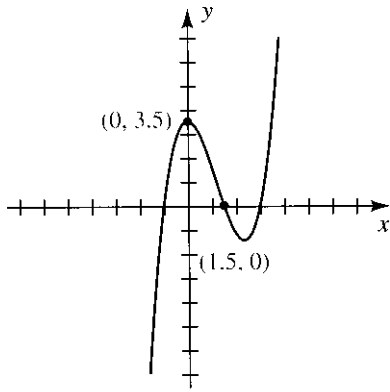
2) $f(x) = 3x + 1$; $g(x) = x^2$

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

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

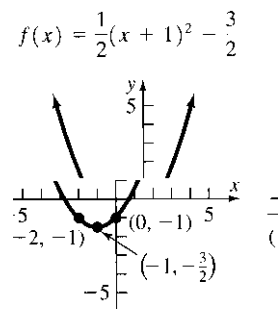
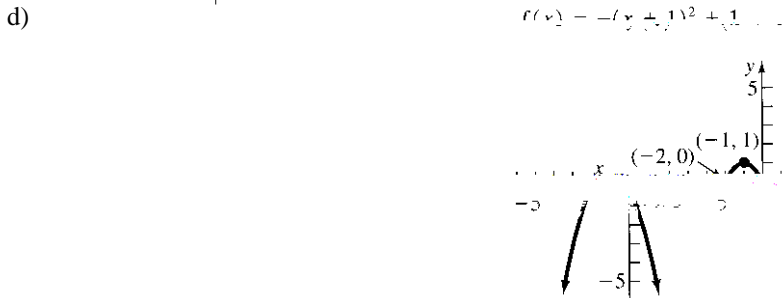
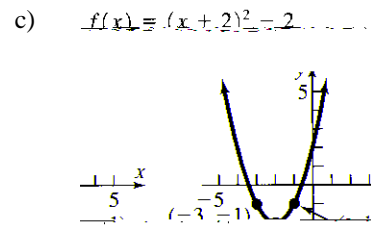
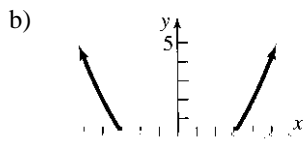
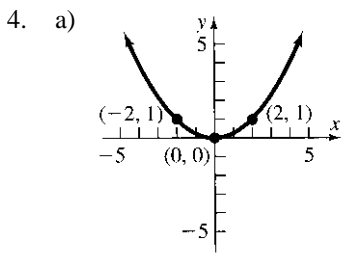
7. Form a polynomial whose zeros and degree are given.

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

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

(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) $(\frac{f}{g})(x) = \frac{\sqrt{x}}{2x-5}$; $\{x|x \geq 0, x \neq \frac{5}{2}\}$

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

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

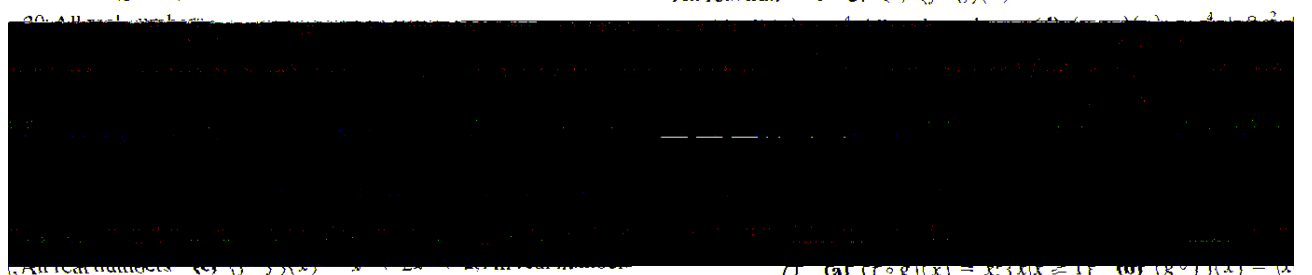
(a) $(f+g)(x) = \frac{6x+3}{3x-2}$; $\{x|x \neq \frac{2}{3}\}$ (b) $(f-g)(x) = \frac{-2x+3}{3x-2}$; $\{x|x \neq \frac{2}{3}\}$

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

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) $(f \circ g)(x) = 9x + 4$; All real numbers

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



(a) $(f \circ g)(x) = x$; $\{x|x \geq 1\}$ (b) $(g \circ f)(x) = \sqrt{x}$; $\{x|x \geq 0\}$ (c) $(f \circ f)(x) = \sqrt{x}$; $\{x|x \geq 0\}$ (d) $(g \circ g)(x) = x$; $\{x|x \geq 1\}$

8. a)

