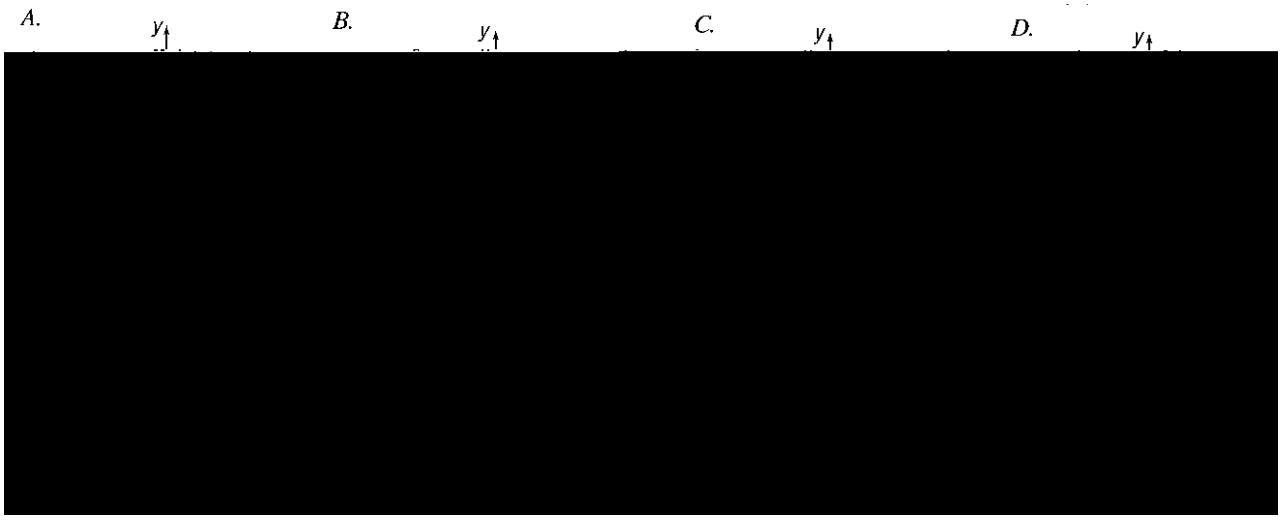
Final Exam: Review Problems

- 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) $f(x) = -x^2 - 1$
b) $f(x) = x^2 - 2x + 1$
c) $f(x) = x^2 + 2x$
d) $f(x) = x^2 + 2x + 1$
e) $f(x) = x^2 - 2x + 2$
f) $f(x) = x^2 - 1$
g) $f(x) = x^2 - 2x$
h) $f(x) = x^2 + 2x + 2$



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

a) $f(x) = \frac{1}{4}x^2$
b) $f(x) = \frac{1}{4}x^2 - 2$
c) $f(x) = x^2 + 4x + 2$
d) $f(x) = 2x^2 - 4x + 1$
e) $f(x) = -x^2 - 2x$
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.

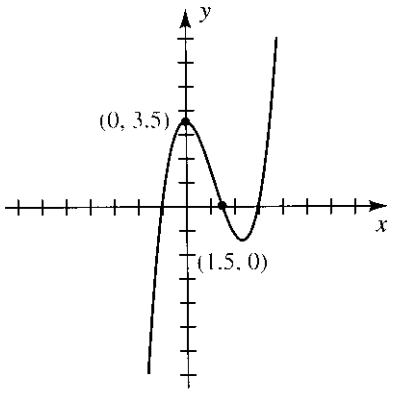
a) $f + g$ b) $f \quad g$ c) $f \cdot g$ d) $\frac{f}{g}$

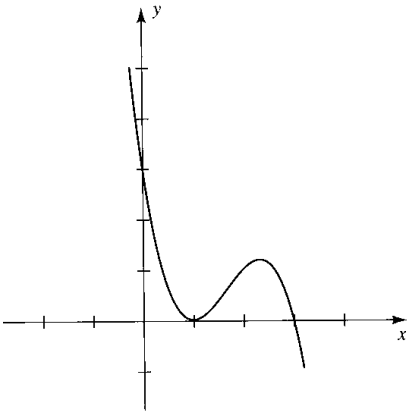
1) $(\ ) = 3x + 4;\ \ g(x) = 2x - 3$
2) $f(x) = x - 1;\ \ g(x) = 2x^2$
3) $f(x) = \sqrt{x};\ \ g(x) = 3x - 5$
4) $f(x) = 1 + \frac{1}{x};\ \ g(x) = \frac{1}{x}$
5) $f(x) = \frac{2x+3}{3x-2};\ \ g(x) = \frac{4x}{3x-2}$

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) -

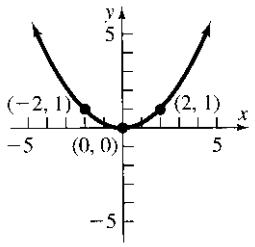




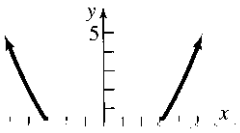
ANSWERS

1. Use the previously downloaded (wzgrapher_e) to check your answers.
2. Use the previously downloaded (wzgrapher_e) to check your answers.
3. Use the previously downloaded (wzgrapher_e) to check your answers.

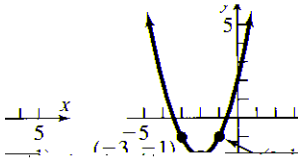
4. a)



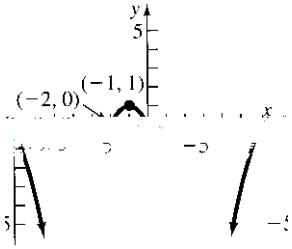
b)



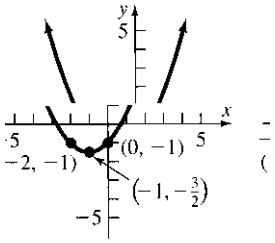
c) $f(x) = (x + 2)^2 - 2$



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



$f(x) = \frac{1}{2}(x + 1)^2 - \frac{3}{2}$



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(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)** $\left(\frac{f}{g}\right)(x) = \frac{x - 1}{2}$; $\{x|x \neq 0\}$

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

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

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

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

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

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3.

8. a)