### Final Exam: Review Problems

- o  Graph using transformations.
- o  Operations with functions.
- o  Composite functions.
- o  Polynomial functions.
- o  Rational functions.
- o  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) 1            1

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

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

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

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

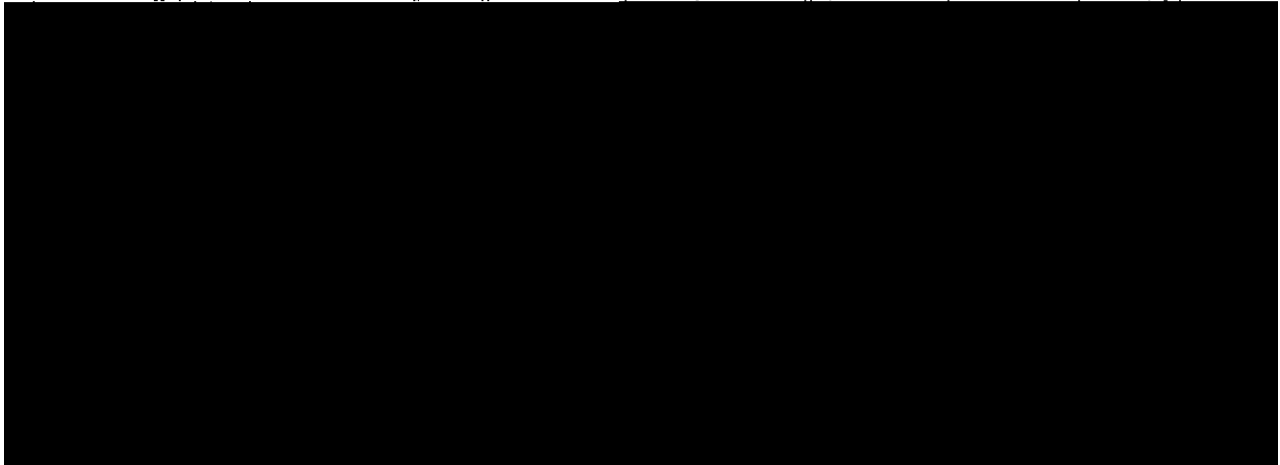A.    $y$        B.    $y$        C.    $y$        D.    $y$

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

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

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

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

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

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

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

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

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

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

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

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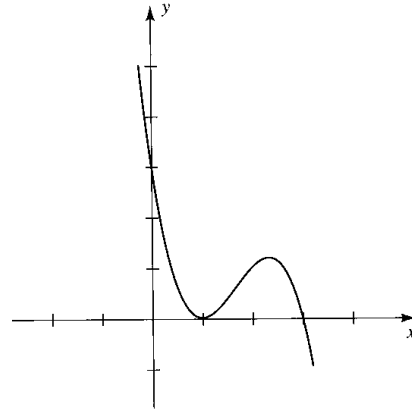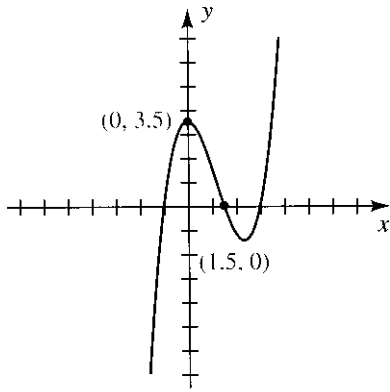
1) $f(x) = 2x + 3$ ;   $g(x) = 3x$

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

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

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

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)

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



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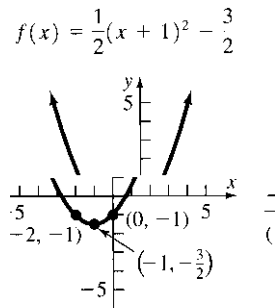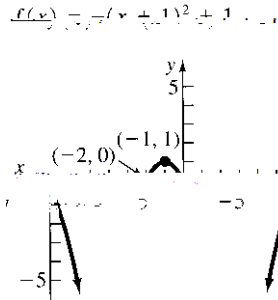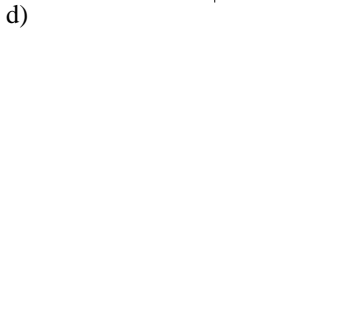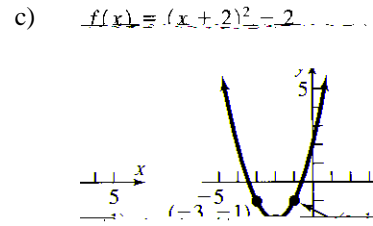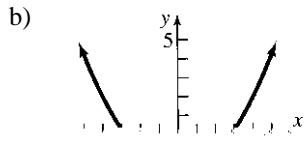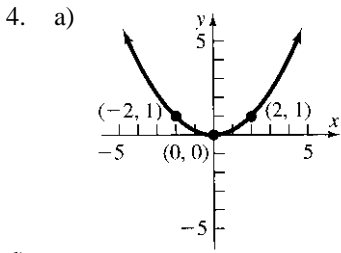


numbers    **(a)** $(f + g)(x) = 2x^3 + x - 1$; All real numbers    **(b)** $(f - g)(x) = -2x^3 + x - 1$; All real nu

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

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

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

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

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

**(a)** $(f \circ g)(x) = 6x + 5$; All real numbers    **(b)** $(g \circ f)(x)$

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

**(a)** $(f \circ g)(x) = x$; $\{x | x \neq 1\}$    **(b)** $(g \circ f)(x) = $

8.    a)