

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

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.



B.



C.



D.



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

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

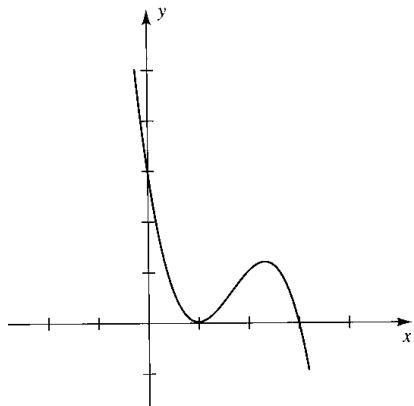
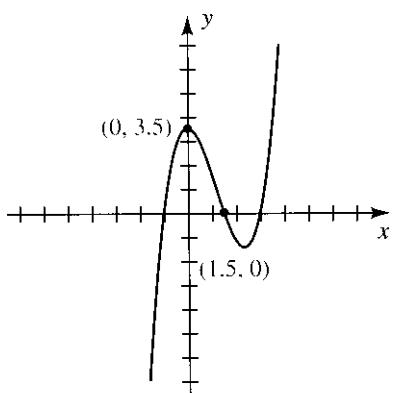
2)  $f(x) = 3x + 1$ ;  $g(x) = x^2$

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.

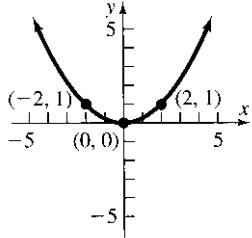
- a) Zeros: -1, 2, 3; degree 3
- b) Zeros: 4, 3, 0; degree 3
- c) -4 and 3 are zeros of multiplicity 2; degree 4
- d) -



## ANSWERS

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.

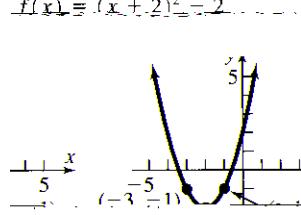
4. a)



b)

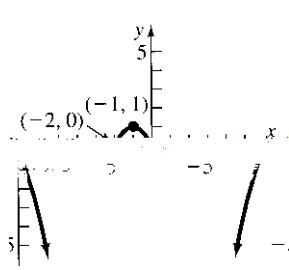


c>

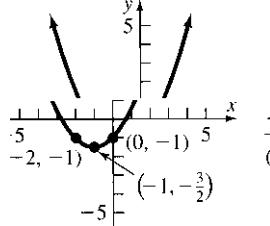


d)

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



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



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

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

$\left( \frac{1}{2} - \frac{1}{2} \right) \left( \frac{1}{2} + \frac{1}{2} \right) = 1^2$

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

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

• 11) (a)  $(f \circ g)(x) = bx + c$  für alle reellen Zahlen  $x$ .

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

All reaction numbers of  $\text{C}_6\text{H}_5\text{CH}_2\text{Cl} + \text{X} \rightarrow \text{C}_6\text{H}_5\text{CH}_2\text{X}$  are given in Table I.

<sup>1</sup> The term "cultural capital" was coined by Bourdieu (1980) to denote the social assets that are transmitted from one generation to the next.

<sup>17</sup> See also the discussion of the relationship between the concept of the "self" and the concept of "subject" in the introduction to this volume.

For more information about the study, please contact Dr. Michael J. Koenig at (314) 747-2100 or via email at [koenig@dfci.harvard.edu](mailto:koenig@dfci.harvard.edu).

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$$\text{iii) } (8 - 8x^2)^{-\frac{1}{2}} = \frac{1}{\sqrt{8 - 8x^2}} = \frac{1}{\sqrt{8(1 - x^2)}} = \frac{1}{\sqrt{8}\sqrt{1 - x^2}} = \frac{1}{2\sqrt{2}\sqrt{1 - x^2}}$$

8. a)

