

- No partial credit will be given for multiple choice problems.
- For all others, show **all** algebraic work to receive full credit.
- Please turn OFF all cell phones, pagers, and other communication devices and put them out of sight.
- All textbooks, notes, etc. must be put away.

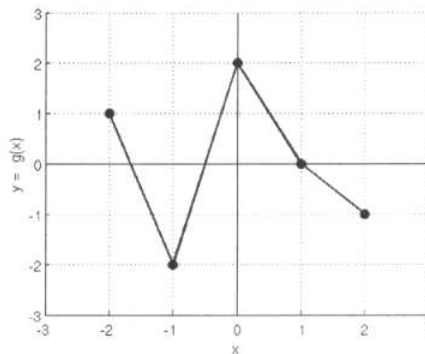
Student's Name (please print): _____

By signing my name below, I agree that I am following all rules and regulations set forth by the Code of Academic Integrity. Furthermore, I agree that I am following all rules set by my instructor and by the course policy for this exam. This includes ensuring that all calculator programs except possibly EVALUATE and QUADRATIC FORMULA have been deleted.

Student's Signature: _____ Date: _____

1. The functions $f(x)$ and $g(x)$ are represented below. Use them to find the following (choose the best answer for each)

x	-2	-1	0	1	2
$f(x)$	-1	1	2	2	0



(i) $(f - g)(2)$

a) 4

b) 3

c) 5

d) 1

e) -2

(ii) $(fg)(1)$

a) 1

b) 0

c) 2

d) -1

e) undefined

(iii) $(f \circ g)(-1)$

a) -2

b) -1

c) 0

d) 1

e) 2

2. Write a formula for each of the transformations of $g(x) = \sqrt{x}$

(i) Shift $g(x)$ 4 units to the left.

$$\sqrt{x+4}$$

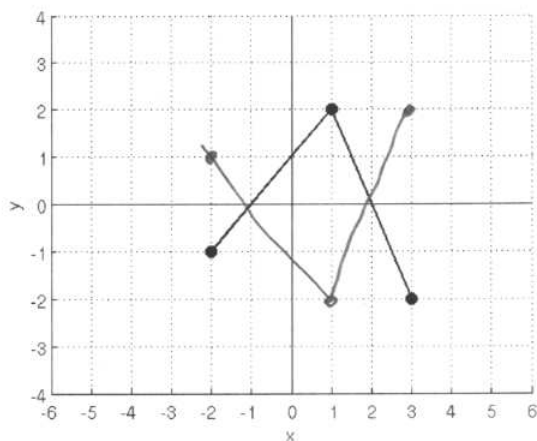
(ii) Reflect $g(x)$ across the x -axis.

$$-\sqrt{x}$$

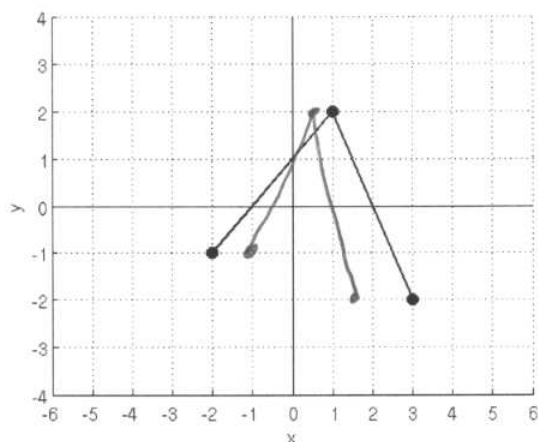
(iii) Reflect $g(x)$ across the y -axis then shift down 3 units.

$$\sqrt{-x} - 3$$

3. The graph below represents $y = f(x)$. On the same axes, carefully draw $y = -f(x)$.



4. The graph below represents $y = f(x)$. On the same axes, carefully draw $y = f(2x)$.



5. Find functions $f(x)$ and $g(x)$ so that $(f \circ g)(x) = 4\sqrt{3x+1}$. Which of the following could be choices for $f(x)$ and $g(x)$?

- (1) $f(x) = 4$ and $g(x) = \sqrt{3x+1}$
 (2) $f(x) = 4\sqrt{x}$ and $g(x) = 3x+1$
 (3) $f(x) = 4\sqrt{x+1}$ and $g(x) = 3x$

- a) 1 only b) 3 only c) 1 and 2 only d) 2 and 3 only e) 1 and 3 only

6. Use the functions $f(x) = x^2 - 1$ and $g(x) = \frac{1}{3-x}$ to answer the following

(i) What is the domain of $(f+g)(x)$?

$$x \neq 3$$

(ii) What is the domain of $\left(\frac{g}{f}\right)(x)$?

$$x \neq 3, 1, -1$$

(iii) Find $(g \circ f)(x)$ and simplify as much as possible.

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

7. It costs a company \$45.00 to produce a pair of shoes. In turn, the company sells a pair for \$90.00. If the fixed costs are \$720.00, how many pairs should the company produce and sell in order to break even (incur no loss and make no profit)?

$$45x = 720 \rightarrow x = 16$$

8. Find an equation of a line perpendicular to $6x + 3y = 1$ passing through the point $(1, 1)$. Express your answer in either point-slope or slope-intercept form.

$$y = \frac{1}{2}x + \frac{1}{2}$$

9. Find the equation of a line going through the points $\left(\frac{5}{3}, 1\right)$ and $(2, 2)$. Express your answer in slope-intercept form.

$$y = 3x - 4$$

10. Find an equation, in slope-intercept form, of a line parallel to $y = 2(x - 3) + 7$, and passing through the point $(0, 5)$. Choose the best answer

a) $y = -\frac{1}{2}x + 5$

b) $y = 2x - 5$

c) $y = 2x + 5$

d) $y = -\frac{1}{2}x - 5$

11. A mortgage lender charges a two types of fees, a fixed fee of \$400 and an additional fee of 2% of the amount of the loan.
- (i) Find a function that determines the total fee in terms of the amount of the loan.

$$400 + 0.02x$$

- (ii) On a particular loan, the fee was \$1400. What was the amount of the loan? Choose the best answer.
- a) \$10,000 b) \$20,000 c) \$30,000 d) \$40,000 e) \$50,000
12. A farmer plans to build a rectangular sheep pen alongside his barn. Since the pen will be up against the barn, that side of the pen will not need fencing. What is the largest area that can be enclosed with 100 feet of fence?

$$-2(w - 25)^2 + 1250$$

$$w = 25$$

$$l = 50$$

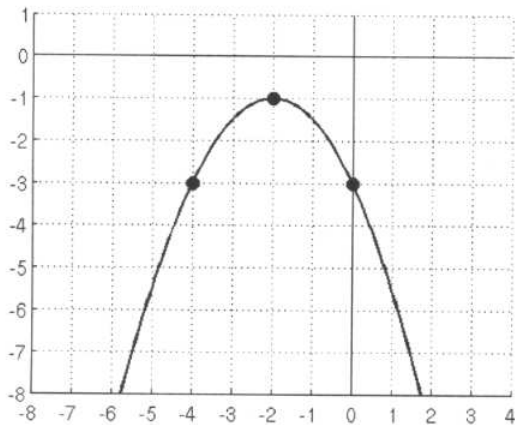
$$A = 1250$$

13. Complete the square to write the function $g(x) = 2x^2 - 24x + 85$ in standard form. Write the equation in standard form and its vertex in the spaces below

Standard Form Equation: $2(x-6)^2 + 13$

Vertex: $(6, 13)$

14. Write an equation in **standard form** for the quadratic function graphed below.



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