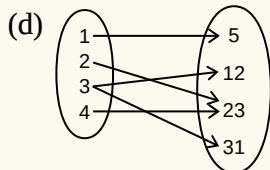
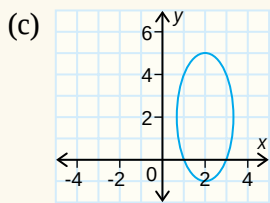
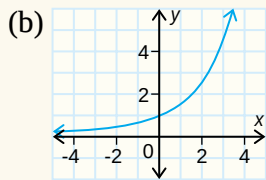
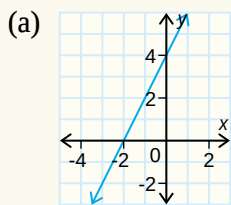


Cumulative Review Test 2

Functions

1. For each relation,
- identify the domain and range
 - tell whether it is a function or not. Justify your answer.



- $\{(-1, 4), (0, 2), (3, 5), (3, 6), (4, 9), (5, 9)\}$
 - $f(x) = \sqrt{2x + 5}$
 - $x = -(y + 2)^2 - 3$
 - $x^2 + y^2 = 9$
2. Given that $f(x) = -3x + 8$, determine
- $f(4)$
 - the value(s) of x where $f(x) = 14$
 - $f^{-1}(6)$
 - the value(s) of x where $f(x) = f^{-1}(x)$

3. Graph each of the following on a number line.

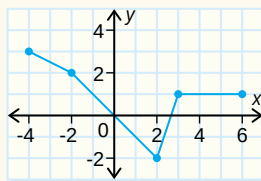
(a) $\{x \mid -4 < x < 3, x \in \mathbb{I}\}$

(b) $\{x \mid x \geq 2, x \in \mathbb{R}\}$

(c) $\{x \mid x^2 \leq 3, x \in \mathbb{R}\}$

4. Assume that $g(x) = 12x - 9$ and $-33 < g(x) < 123$. Find the domain of $g(x)$.

5. The graph of $y = f^{-1}(x)$ is shown.



- Draw the graph of f .
- Is f a function? Explain.

6. For each quadratic function

- find the coordinates of the vertex by completing the square
- state the domain and the range
- sketch the graph

(a) $f(x) = x^2 + 10x - 22$

(b) $f(x) = 3x^2 + 8x$

(c) $f(x) = \frac{2}{3}x^2 + 4x - 8$

7. For each function

- determine the equation of g^{-1}
- sketch g and g^{-1} on the same set of axes
- state the domain and range of g and of g^{-1}

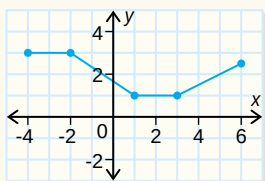
(a) $g(x) = 2x^2 + 12x - 14$

(b) $g(x) = \sqrt{4x + 8}$

8. Graph each equation. In each case, begin by graphing $f(x) = x^3$ on the same axes.

(a) $y = 3f(x)$ (b) $y = f\left(\frac{1}{2}x\right)$
 (c) $y = f(x - 2)$ (d) $y = f(x) + 2$
 (e) $y = -f(x)$ (f) $y = f(-x)$

9. The graph of $y = g(x)$ is shown, and $f(x) = \frac{1}{2}g(2x - 4) - 1$.



- (a) Draw an input/output diagram for f .
 (b) Determine the domain and range of f .
 (c) Evaluate $f(4)$.
 (d) Graph f .
10. The demand function for a new product is $p(x) = -4x + 28$, where x is the number of items sold in thousands and p is the price in dollars. The cost function is $C(x) = 4x + 12$.
- (a) State the corresponding revenue function.
 (b) Find the corresponding profit function.
 (c) Complete the square to find the value of x that will maximize profits.
 (d) How many items must be sold for the company to break even?
 (e) Sketch the graph of the profit function.

11. When priced at \$40 each, a toy has annual sales of 5000 units. The manufacturer estimates that each \$1 increase in cost will decrease sales by 100 units. Find the unit price that will maximize the total revenue.

12. Without drawing the graph,
- find the number of zeros for each function
 - indicate whether the graph touches the x -axis at one point, intersects the x -axis at two points, or does not meet the x -axis

(a) $f(x) = 4x^2 + 12x + 9$
 (b) $g(x) = -2(x - 0.5)^2 + 12.5$
 (c) $h(x) = -3(x + 1.9)^2$

13. Solve each quadratic equation for x , where $x \in \mathbb{C}$. Round to two decimal places, where necessary.

(a) $2x^2 + 5x - 3 = 0$
 (b) $3x^2 + 48 = 0$
 (c) $3x^2 - 2x + 3 = 0$
 (d) $5x^2 - 4x + 20 = 0$

14. Draw $f(x)$, $\frac{1}{f(x)}$, and f^{-1} on the same axes. State the domain and the range for each of the three functions for each part.

(a) $f(x) = 4x + 3$
 (b) $f(x) = 4x^2 - 9$
 (c) $f(x) = x + 3 - 5$

15. For each rational function, find

- find the zeros
- find the asymptotes
- find the domain
- graph the function and estimate the range

(a) $f(x) = \frac{2x + 4}{x - 1}$

(b) $g(x) = \frac{-2x}{x^2 - 6x + 9}$

(c) $h(x) = \frac{x^2 - x - 30}{x + 2}$

16. Simplify.

(a) $(2x^4 - 3x^2 - 6) + (6x^4 - x^3 + 4x^2 + 5)$

(b) $(x^2 - 4)(2x^2 + 5x - 2)$

(c) $-7x(x^2 + x - 1) - 3x(2x^2 - 5x + 6)$

(d) $-2x^2(3x^3 - 7x + 2) - x^3(5x^3 + 2x - 8)$

(e) $-2x[5x - (2x - 7)] + 6x[3x - (1 + 2x)]$

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

(g) $(x^2 + 5x - 3)^2$

17. Simplify. State any restrictions.

(a) $\frac{2x + 4}{x^2 - 4}$

(b) $\frac{18p^2q^2}{-6p^{-1}q^3}$

(c) $\frac{25x^2 - 9}{4x^2 + x - 3} \times \frac{8x - 6}{5x^2 + 8x + 3}$

(d) $\frac{a^2 - 3a - 10}{a^2 - a + 12} \div \frac{a^2 - 5a - 15}{a^2 + 7a + 12}$

(e) $\frac{a^2 + 6ab + 8b^2}{a^2 + 14ab + 20b^2} \times \frac{a^2 + 5ab - 6b^2}{a^2 - ab - 6b^2}$
 $\div \frac{a^2 + 8ab + 12b^2}{a^2 + 2ab - 15b^2}$

(f) $\frac{2}{b + 7} + \frac{3}{4 - 3b}$

(g) $\frac{3}{x^2 - x - 12} - \frac{2}{x^2 - 16}$

(h) $\frac{a + b}{a} - \frac{a - b}{ab + b^2} - \frac{2a + b}{b}$

Functions and Relations

18U. Simplify.

(a) $(-4i)^2$

(b) $2i^9$

(c) $(2 - 7i)(2 + 7i)$

(d) $(-3 - 4i) + (2 - 3i) - (4 - 5i)$

(e) $\frac{3 - 5i}{8 + 3i}$

(f) $[(-i + (3 - 5i))]^3$

(g) $\frac{(-1 + 4i)^2}{(2 + i)(3 + i)}$

(h) $\frac{(6 - 3i) - (7 + 2i)}{(2 + 3i) + (2 - i)}$