



Precalculus

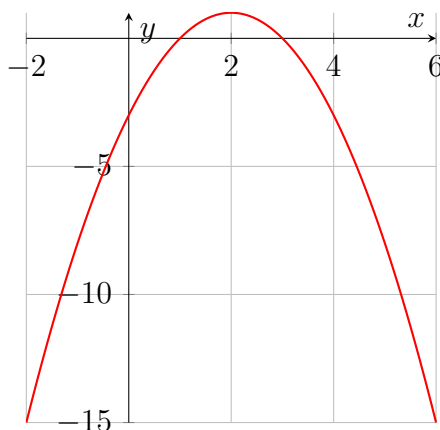
Topic: Quadratic Functions and Models

Instructions

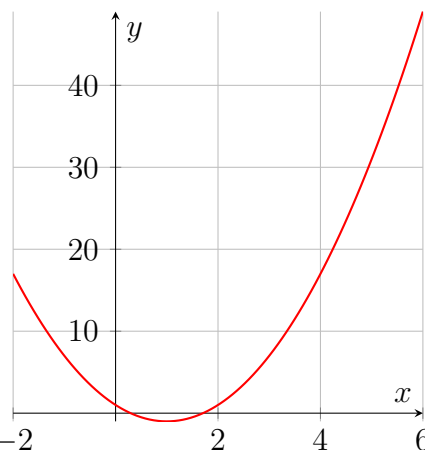
Solve the following problems related to quadratic functions and models. Show all work clearly and check your solutions.

Practice Problems

1. The graph of a quadratic function is given. (a) Find the coordinates of the vertex. (b) Find the maximum or minimum value of f . (c) Find the domain and range of f .



(i) $f(x) = -x^2 + 4x - 3$



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

2. A quadratic function is given. (a) Express the quadratic function in standard form. (b) Find its vertex and its x- and y-intercept(s). (c) Sketch its graph.

(i) $f(x) = x^2 - 6x - 4$

(ii) $f(x) = x^2 + 8x + 12$

(iii) $f(x) = -x^2 + 10x - 20$

(iv) $f(x) = 3x^2 - 12x + 8$

(v) $f(x) = -\frac{1}{2}x^2 + 4x + 6$

3. Find the maximum or minimum value of the function.

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

(ii) $f(x) = -x^2 + 6x - 9$

(iii) $g(x) = 2x^2 - 8x + 3$

(iv) $f(x) = 5x^2 - 20x + 15$

(v) $g(x) = -3x^2 + 12x + 5$

4. A quadratic function is given. (a) Express the quadratic function in standard form. (b) Sketch its graph. (c) Find its maximum or minimum value.

(i) $f(x) = (x + 4)^2 - 7$

(ii) $f(x) = (x - 3)^2 + 5$

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

(iv) $f(x) = 2(x - 5)^2 - 10$

5. Find the coordinates of the vertex and the axis of symmetry for the following functions.

(i) $f(x) = x^2 + 6x + 8$

(ii) $f(x) = -x^2 + 4x + 7$

(iii) $f(x) = 3x^2 - 12x + 9$

6. Identify the direction in which the parabola opens.

(i) $y = 2x^2 + 3x - 4$

(ii) $y = -x^2 + 6x - 8$

Multiple-Choice Questions

1. What is the vertex of the quadratic function $y = 3x^2 - 12x + 7$?

A. $(2, -5)$

B. $(2, 1)$

C. $(0, 7)$

D. $(-2, 7)$

2. What are the solutions to the equation $x^2 + 5x + 6 = 0$?

A. $x = -2, -3$

B. $x = 1, -6$

C. $x = -1, 6$

D. $x = 3, -2$

3. The quadratic function $y = -x^2 + 4x + 5$ has a vertex at:

A. $(2, 9)$

B. $(2, 5)$

C. $(-2, 9)$

D. $(-2, -5)$

4. What is the discriminant of the quadratic equation $2x^2 + 4x - 6 = 0$?

A. 36

B. 16

C. 8

D. 4

5. What is the maximum value of the quadratic function $y = -3x^2 + 12x - 7$?

A. 8

B. 7

C. 9

D. 6