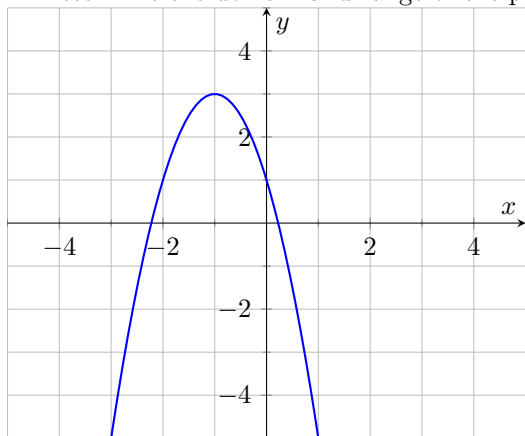
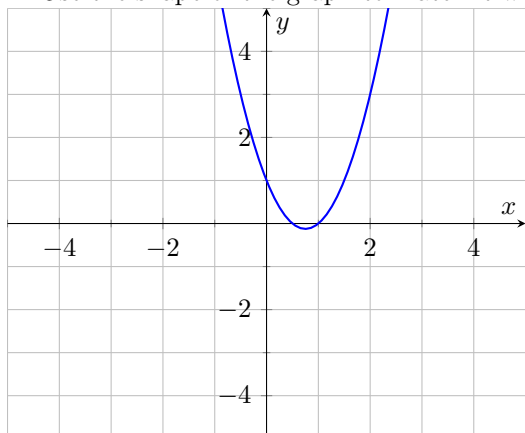


1. Determine the domain and range of the parabola. Also, say if the parabola opens upward or downward.



- A. The domain is $D = [3, \infty)$ and the range is $R = \mathbb{R}$. The parabola opens upward.
- B. The domain is $D = (-\infty, 3]$ and the range is $R = \mathbb{R}$. The parabola opens downward.
- C. The domain is $D = \mathbb{R}$ and the range is $R = [3, \infty)$. The parabola opens downward.
- D. The domain is $D = \mathbb{R}$ and the range is $R = (-\infty, 3]$. The parabola opens downward.
- E. The domain is $D = \mathbb{R}$ and the range is $R = [3, \infty)$. The parabola opens upward.
- F. The domain is $D = [3, \infty)$ and the range is $R = \mathbb{R}$. The parabola opens downward.

2. Use the shape of the graph to match it with the function that defines this graph.



- A. $f(x) = 2x + 1$
- B. $f(x) = -2x^2 - 3x + 1$
- C. $f(x) = -x + 1$
- D. $f(x) = 2x^2 - 3x + 1$

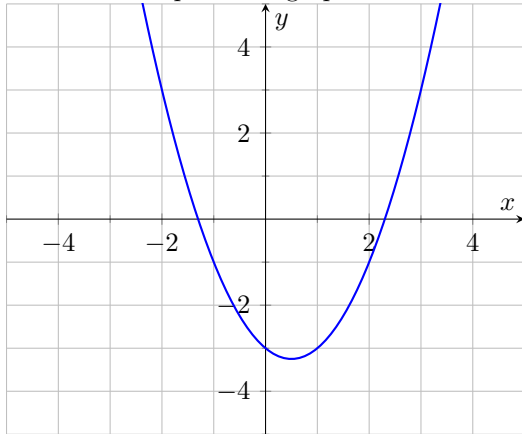
3. Find the vertex of the parabola $f(x) = 4x^2 - 4x + 5$.

- A. The vertex is $(-\frac{7}{2}, 0)$.
- B. The vertex is $(-\frac{3}{2}, 2)$.
- C. The vertex is $(-\frac{9}{2}, -1)$.
- D. The vertex is $(-\frac{7}{2}, 7)$.
- E. The vertex is $(-\frac{1}{2}, 3)$.
- F. The vertex is $(\frac{1}{2}, 4)$.
- G. The vertex is $(-\frac{5}{2}, 1)$.
- H. The vertex is $(-\frac{9}{2}, 8)$.

4. Find the y -intercept, x -intercepts, and vertex of the parabola $f(x) = -2x^2 - x + 6$.

- A. The y -intercept is $(0, 6)$. The x -intercepts are $(\frac{13}{2}, 0)$ and $(3, 0)$. The vertex is $(-\frac{1}{4}, \frac{49}{8})$.
- B. The y -intercept is $(0, 11)$. The x -intercepts are $(\frac{13}{2}, 0)$ and $(3, 0)$. The vertex is $(\frac{19}{4}, \frac{49}{8})$.
- C. The y -intercept is $(0, 11)$. The x -intercepts are $(\frac{3}{2}, 0)$ and $(3, 0)$. The vertex is $(\frac{19}{4}, \frac{49}{8})$.
- D. The y -intercept is $(0, 6)$. The x -intercepts are $(\frac{13}{2}, 0)$ and $(3, 0)$. The vertex is $(\frac{19}{4}, \frac{89}{8})$.
- E. The y -intercept is $(0, 6)$. The x -intercepts are $(\frac{3}{2}, 0)$ and $(-2, 0)$. The vertex is $(-\frac{1}{4}, \frac{49}{8})$.
- F. The y -intercept is $(0, 11)$. The x -intercepts are $(\frac{3}{2}, 0)$ and $(3, 0)$. The vertex is $(\frac{19}{4}, \frac{89}{8})$.
- G. The y -intercept is $(0, 11)$. The x -intercepts are $(\frac{13}{2}, 0)$ and $(-2, 0)$. The vertex is $(-\frac{1}{4}, \frac{89}{8})$.
- H. The y -intercept is $(0, 11)$. The x -intercepts are $(\frac{13}{2}, 0)$ and $(3, 0)$. The vertex is $(-\frac{1}{4}, \frac{89}{8})$.

5. Use the shape of the graph to match it with the function that defines this graph.

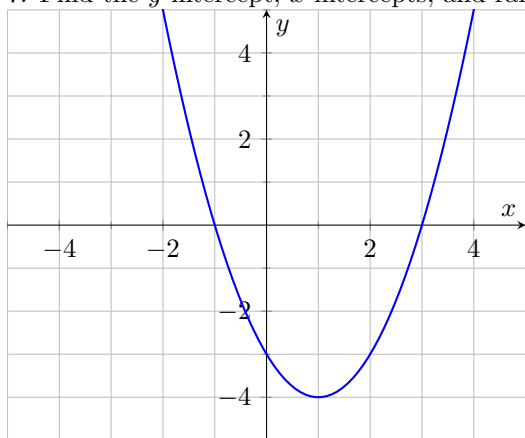


- A. $f(x) = -x^2 - x - 3$
- B. $f(x) = x - 3$
- C. $f(x) = -3x - 3$
- D. $f(x) = x^2 - x - 3$

6. Billy Bob owns a coal mine. One day he noticed, contrary to his expectations, that selling more coal doesn't necessarily mean more profit (since producing and selling more coal incurs greater labor and equipment costs). Looking at data from the last year, Billy Bob (with the help of some mathematically inclined friends of course) created a function $P(x) = -100x^2 + 6000x - 25000$ which gives the profit in dollars when x tons of coal are produced and sold. Graph this function and use it to help Billy Bob determine the following:

- a. his overhead costs (Hint: Evaluate $P(0)$.)
 - b. the break-even values (Hint: When does $P(x) = 0$?) Round your answers to the nearest hundredth.
 - c. his maximum profit that can be made and the number of tons to sell to create this profit.
- A. The overhead costs are \$25000. The break even points are 4.5 tons and 55.5 tons. The maximum profit of \$65000 is reached when 30 tons of coal are produced and sold.
 - B. The overhead costs are \$21000. The break even points are 4.5 tons and 55.5 tons. The maximum profit is \$65000 is reached when 30 tons of coal are produced and sold.
 - C. The overhead costs are \$21000. The break even points are 4.5 tons and 55.5 tons. The maximum profit is \$68000 is reached when 30 tons of coal are produced and sold.
 - D. The overhead costs are \$25000. The break even points are 5.5 tons and 56.5 tons. The maximum profit is \$65000 is reached when 31 tons of coal are produced and sold.
 - E. The overhead costs are \$25000. The break even points are 4.5 tons and 55.5 tons. The maximum profit is \$66000 is reached when 30 tons of coal are produced and sold.
 - F. The overhead costs are \$21000. The break even points are 7.5 tons and 58.5 tons. The maximum profit is \$62000 is reached when 33 tons of coal are produced and sold.

7. Find the y -intercept, x -intercepts, and range of the parabola graphed below.



- A. The y -intercept is $(0, -3)$. The x -intercepts are $(-1, 0)$ and $(-2, 0)$. The range is $R = (-\infty, -9]$.
- B. The y -intercept is $(0, -3)$. The x -intercepts are $(-1, 0)$ and $(3, 0)$. The range is $R = [-4, \infty)$.
- C. The y -intercept is $(0, -3)$. The x -intercepts are $(-1, 0)$ and $(-2, 0)$. The range is $R = [-9, \infty)$.
- D. The y -intercept is $(0, -8)$. The x -intercepts are $(-6, 0)$ and $(3, 0)$. The range is $R = (-\infty, -4]$.
- E. The y -intercept is $(0, -3)$. The x -intercepts are $(-6, 0)$ and $(-2, 0)$. The range is $R = [-9, \infty)$.
- F. The y -intercept is $(0, -8)$. The x -intercepts are $(-1, 0)$ and $(-2, 0)$. The range is $R = (-\infty, -9]$.
- G. The y -intercept is $(0, -8)$. The x -intercepts are $(-6, 0)$ and $(3, 0)$. The range is $R = [-9, \infty)$.
- H. The y -intercept is $(0, -8)$. The x -intercepts are $(-6, 0)$ and $(3, 0)$. The range is $R = (-\infty, -4]$.

8. Find the y -intercept, x -intercepts, and vertex of the parabola $f(x) = -9x^2 + 3x + 6$.

- A. The y -intercept is $(0, 7)$. The x -intercepts are $(-\frac{2}{3}, 0)$ and $(2, 0)$. The vertex is $(\frac{7}{6}, \frac{29}{4})$.
- B. The y -intercept is $(0, 6)$. The x -intercepts are $(\frac{1}{3}, 0)$ and $(2, 0)$. The vertex is $(\frac{1}{6}, \frac{29}{4})$.
- C. The y -intercept is $(0, 7)$. The x -intercepts are $(-\frac{2}{3}, 0)$ and $(2, 0)$. The vertex is $(\frac{7}{6}, \frac{29}{4})$.
- D. The y -intercept is $(0, 6)$. The x -intercepts are $(-\frac{2}{3}, 0)$ and $(1, 0)$. The vertex is $(\frac{1}{6}, \frac{25}{4})$.
- E. The y -intercept is $(0, 7)$. The x -intercepts are $(\frac{1}{3}, 0)$ and $(2, 0)$. The vertex is $(\frac{7}{6}, \frac{25}{4})$.
- F. The y -intercept is $(0, 7)$. The x -intercepts are $(\frac{1}{3}, 0)$ and $(1, 0)$. The vertex is $(\frac{7}{6}, \frac{29}{4})$.
- G. The y -intercept is $(0, 6)$. The x -intercepts are $(\frac{1}{3}, 0)$ and $(1, 0)$. The vertex is $(\frac{1}{6}, \frac{29}{4})$.
- H. The y -intercept is $(0, 6)$. The x -intercepts are $(\frac{1}{3}, 0)$ and $(2, 0)$. The vertex is $(\frac{7}{6}, \frac{25}{4})$.