

unicate Your Understanding

one step of completing the square, you divide the coefficient of x by 2 and square the result. Why?

ow are the functions $f(x) = 4x(x - 3)$, $g(x) = 4x(x - 3) + 2$, and $h(x) = 4x(x - 3) - 1$ related? Explain using words and diagrams.

an does not understand the concept of partial factoring to determine the vertex. Use the function $y = 3x^2 - 9x - 17$ to outline the technique for him.

actise

with questions 1 and 2, refer to Example 1.

plete the square for each function.

$y = x^2 + 4x$

$f(x) = x^2 + 7x + 11$

$g(x) = x^2 - 3x + 1$

$y = x^2 - 11x - 4$

$f(x) = x^2 + 13x + 2$

$y = x^2 - 9x - 9$

etermine the vertex of each quadratic function by completing the square. State if the vertex is a minimum or a maximum.

$f(x) = x^2 + 10x + 6$

$g(x) = 2x^2 + 12x + 16$

$f(x) = -3x^2 + 6x + 1$

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

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

$g(x) = \frac{2}{3}x^2 + \frac{16}{3}x + \frac{25}{3}$

with question 3, refer to Example 2.

partial factoring to determine the vertex of each function. State if the vertex is a minimum or a maximum.

$f(x) = 3x^2 - 6x + 11$

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

$f(x) = \frac{1}{2}x^2 - 3x + 8$

$g(x) = -\frac{5}{3}x^2 + 5x - 10$

$f(x) = 0.3x^2 - 3x + 6$

$g(x) = -0.2x^2 - 2.8x - 5.4$

4. Use Technology Use a graphing calculator to verify your answers to questions 2 and 3.

B Connect and Apply

For help with questions 5 and 6, refer to Example 3.

5. An electronics store sells an average of 60 entertainment systems per month at an average of \$800 more than the cost price. For every \$20 increase in the selling price, the store sells one fewer system. What amount over the cost price will maximize revenue?

6. Last year, a banquet hall charged \$30 per person, and 60 people attended the hockey banquet dinner. This year, the hall's manager has said that for every 10 extra people that attend the banquet, they will decrease the price by \$1.50 per person. What size group would maximize the profit for the hall this year?

For help with question 7, refer to Example 4.

7. A ball is kicked into the air and follows a path described by $h(t) = -4.9t^2 + 6t + 0.6$, where t is the time, in seconds, and h is the height, in metres, above the ground. Determine the maximum height of the ball, to the nearest tenth of a metre.

