If necessary, round answers to the nearest hundredth.

1. A rock club’s profit from booking local bands depends on the ticket price. Using past receipts, the owners find that the profit \( p \) can be modeled by the function \( p = -10t^2 + 500t + 75 \), where \( t \) represents the ticket price in dollars. What price gives the maximum profit? What is the maximum profit?

2. The height \( h(t) \) in feet of a ball thrown in the air after \( t \) seconds can be modeled by the formula \( h(t) = -16t^2 + 144t \). What is the maximum height of the ball?

3. Two skaters are practicing at the same time on the same rink. One skater follows the path \( y = -2x + 32 \), while the other skater follows the curve \( y = -2x^2 + 18x \). Find all points where they might collide if they are not careful.

4. The length of a rectangle is 5 inches more than its width. The area of the rectangle is 14 square inches. What are the dimensions of the rectangle?

5. The function \( y = -16t^2 + 8000 \) gives a jumper’s height \( y \) in feet after \( t \) seconds for a jump from 8000 feet. How long is a free fall if the parachute opens at 2500 feet?

6. The amount of cloth used to make four curtains is given by the function \( A = -4x^2 + 40x \), where \( x \) is the width of one curtain in feet and \( A \) is the total area in square feet. Find the width that maximizes the area of the curtains. What is the maximum area?

7. A rectangular pool is 20 ft wide and 50 ft long. The pool is surrounded by a walkway. The walkway is the same width all the way around the pool. The total area of the walkway is 456 square ft. How wide is the walkway?

8. A coin is dropped from the top of a 240 foot building. Using the formula \( h = -16t^2 + s \), where \( h \) is the height (in feet) of the coin at \( t \) seconds and \( s \) is the starting height (in feet) at which the coin is being dropped from, how long will it take for the coin to hit the ground?

9. The sum of 5 times a member and its square is 50. Find the numbers.

10. Ten more than the square of a number is equal to seven times the number. Find the numbers.
11. You are painting a large wall mural. The wall length is 3 times the height. The area of the wall is 300 ft².
   a. What are the dimensions of the wall?
   b. If each can of paint covers 22 ft², will 12 cans be enough to cover the wall?

12. Sarah launches a toy water rocket from ground level. Its distance above the ground t seconds after launch is given in feet by the formula \( d = 160t - 16t^2 \). When will the rocket reach the greatest height and what will that height be?

13. If the height of a ball is modeled by the formula \( h = -16t^2 + 120t + 50 \), where \( h \) is the height of the ball after \( t \) seconds, how high will the ball be after 1.5 seconds?

14. The length of a rectangle is 2 feet more than its width. Find the dimensions of the rectangle if its area is 63 square feet.

15. A small independent motion picture company determines the profit \( P \) for producing \( n \) DVD copies of a recent release is \( P = -0.02n^2 + 3.40n - 16 \). \( P \) is the profit in thousands of dollars and \( n \) is in thousands of units.
   a. How many DVDs should the company produce to maximize the profit?
   b. What will the maximize profit be?

16. A local nursery sells a large number of ornamental trees every year. The owners have determined the cost per tree \( C \) for buying and caring for each tree before it is sold is \( C = 0.001n^2 - 0.3n + 50 \). In this function, \( C \) is the cost per tree in dollars and \( n \) is the number of trees in stock.
   a. How many trees will minimize the cost per tree?
   b. What will the minimum cost per tree be?

17. The Gateway Arch in St. Louis was built in 1965. It is the tallest monument in the United States. The arch can be modeled with the function \( y = -0.00635x^2 + 4x \), where \( x \) and \( y \) are in feet.
   a. How high above the ground is the tallest point of the arch?
   b. How far apart are the legs of the arch at their bases?

18. The height of a batted ball is modeled by the function \( h = -0.01x^2 + 1.22x + 3 \) where \( x \) is the horizontal distance in feet from the point of impact with the bat, and \( h \) is the height of the ball in feet.
   a. What is the maximum height that the ball will reach?
   b. At what distance from the batter will the ball hit the ground?