

Application Problems 2

1. The number of bacteria in a refrigerated food is given by $n(t) = 30t^2 - 20t + 160$ where “ t ” is the temperature of the food in Celsius. At what temperature will the number of bacteria be minimal?
2. The height “ h ” in feet of an object above the ground is given by $h(t) = -16t^2 + 64t + 220$ where “ t ” is the time in seconds. Find the maximum height of the object and at what time it reaches the maximum height.
3. Patti hits a golf ball off the tee. The height of the ball is given by $y(x) = -16x^2 + 4300x + 3650$ where “ y ” is the height in yards above the ground and “ x ” is the horizontal distance from the tee in yards. What is the maximum height of the ball?
4. The number of board feet in a 16 foot long tree is approximated by the model $F(d) = 0.8d^2 - 1.4d - 9.6$ where “ F ” is the number of feet and “ d ” is the diameter of the log. How many board feet are in a log with diameter 12 inches? What is the diameter that will produce the minimum number of board feet?
5. For the years of 1986 to 1998, the number of mountain bike owners “ m ” (in thousands) in Canada can be approximated by the model where $m(t) = 0.35t^2 - 2.36t + 4.24$. In what year was the number of mountain bike owners at a minimum?
6. A manufacturer of tennis balls has a daily cost of $C(x) = 240 - 15x + 0.01x^2$ where “ C ” is the total cost in dollars and “ x ” is the number of tennis balls produced. What number of tennis balls will produce the minimum?
7. The value of Ahmed’s stock portfolio is given by the function $v(t) = 70 + 85t - 3t^2$ where “ v ” is the value of the portfolio in hundreds of dollars and “ t ” is the time in months. When will the value of Ahmed’s portfolio be at a maximum?
8. The value of Kim’s stock portfolio is given by the function $v(t) = 60 + 80t + 3t^2$ where “ v ” is the value of the portfolio in hundreds of dollars and “ t ” is the time in months. How much money did Jon start with? What is the minimum value of Jon’s portfolio?
9. Find the number of units that produce the maximum revenue, where $R(x) = 860 - 0.2x^2$ is the total revenue (in dollars) and “ x ” is the number of units sold.
10. A textile manufacturer has daily production costs of $C(x) = 9,000 - 100x + 0.06x^2$, where “ C ” is the total cost (in dollars) and “ x ” is the number of units produced. How many units should be produced each day to yield a minimum cost?
11. A manufacturer of light fixtures has daily production costs of $C(x) = 900 - 8x + 0.3x^2$ where “ C ” is the total cost (in dollars) and “ x ” is the number of units produced. How many units should be produced every day to yield a minimum cost?
12. The height “ h ” in feet of a projectile launched vertically upward from the top of a 96-foot tall bridge is given by $h(t) = 110 + 16t - 16t^2$ where “ t ” is time in seconds. What is the maximum height and how long will it take the projectile to strike the ground?