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Course: Calc 1 11:30 AM / Internet
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Assignment: 4.5 Applied Optimization

1. Find the smallest perimeter and the dimensions for a rectangle with an area of 49 in².

The smallest perimeter for a rectangle with an area of 49 in² is in.
(Simplify your answer.)

The dimensions of this rectangle are in.
(Simplify your answers. Use a comma to separate answers.)

2. A rectangular plot of farmland will be bounded on one side by a river and on the other three sides by a single-strand electric fence. With 2500 m of wire at your disposal, what is the largest area you can enclose, and what are its dimensions?

The maximum area of the rectangular plot is m².

The length of the shorter side of the rectangular plot is m.
The length of the longer side of the rectangular plot is m.

3. A rectangular tank that is 2048 ft³ with a square base and open top is to be constructed of sheet steel of a given thickness. Find the dimensions of the tank with minimum weight.

The dimensions of the tank with minimum weight are ft.
(Simplify your answer. Use a comma to separate answers.)

4. You are designing a 32 cm³ right circular cylindrical can whose manufacturer will take waste into account. There is no waste in cutting the aluminum for the side, but the top and bottom of radius r will be cut from squares that measure 4r units on a side. The total amount of aluminum used up by the can will therefore be $A = 32r^2 + 2\pi rh$, where h is the height of the right circular cylindrical can. What is the ratio of h to r for the most economical can?

The ratio of h to r for the most economical can is $\frac{32}{\pi}$.
(Type an exact answer in terms of π as needed.)

5. The height (feet) of an object moving vertically is given by $s = -16t^2 + 256t + 192$, where t is in seconds. Find the object's velocity at $t = 5$, its maximum height and when it occurs, and its velocity when $s = 0$.

The velocity of the object at $t = 5$ seconds is ft/second.
(Simplify your answer. Type an integer or a decimal.)

The maximum height occurs at $t = 8$ seconds.
(Simplify your answer. Type an integer or a decimal.)

The maximum height is feet.
(Simplify your answer. Type an integer or a decimal.)

The velocity when $s = 0$ is feet/second.
(Round to the nearest hundredth.)

6. It costs 6 dollars to manufacture and distribute a backpack. If the backpacks sell at x dollars each, the number sold, n , is given by $n = \frac{9}{x-6} + 5(100-x)$. Find the selling price that will maximize profit.
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The selling price that will maximize profit is \$.
(Simplify your answer.)

7. Suppose that $c(x) = 2x^3 - 20x^2 + 16,000x$ is the cost of manufacturing x items. Find a production level that will minimize the average cost of making x items.
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The production level that minimizes the average cost of making x items is $x =$.
(Simplify your answer.)

At this level, the average cost of making x items is \$.
(Simplify your answer.)