Homework 7.4 – The Extreme Value Theorem and Optimization

1. **(1 pt) alfredLibrary/AUCI/chapter7/lesson4/EVT2pet.pg**
Use the Extreme Value Theorem to find the absolute maximum and absolute minimum values of $f(t) = t\sqrt{9-t^2}$ on the interval $[-3,3]$. Your answers should be the maximum and minimum function values, not the t-values.

Absolute maximum is ________.

Absolute minimum is ________.

2. **(1 pt) alfredLibrary/AUCI/chapter7/lesson4/optimization2pet.pg**
A rancher wants to fence in an area of 500000 square feet in a rectangular field and then divide it in half with a fence down the middle parallel to one side. What is the minimum amount of fencing needed to complete this task?

Minimum amount of fencing = ____________ ft

3. **(1 pt) alfredLibrary/AUCI/chapter7/lesson4/optimization3pet.pg**
If 432cm^2 of material is available to make a box with a square base and an open top, find the largest possible volume of the box.

Largest volume = ____________ cm^3

4. **(1 pt) alfredLibrary/AUCI/chapter7/lesson4/optimization4pet.pg**
A fence is to be built to enclose a rectangular area of 270 square feet. The fence along three sides is to be made of material that costs 4 dollars per foot, and the material along the fourth side costs 12 dollars per foot. Find the length and width of the enclosure that is most economical to construct.

Length = ____ ft

Width = ____ ft

5. **(1 pt) alfredLibrary/AUCI/chapter7/lesson4/quiz-/optimization2pet.pg**
A box is to be made out of a 8 cm by 20 cm piece of cardboard. Squares of side length x cm will be cut out of each corner, and then the ends and sides will be folded up to form a box with an open top.

(a) Draw a labeled sketch.

(b) Express the volume V of the box as a function of x.

$V(x) =$ ____________________ cm^3

(c) Give the domain of V in interval notation.

Domain = ________________

(d) Find the length L, width W, and height x of the resulting box that maximizes the volume. (Assume that $W \leq L$. That is, assume that the width W of the box is the side formed from the shorter side of cardboard, and the length L of the box is the side formed from the longer side.)

$L =$ ________ cm

$W =$ ________ cm

$x =$ ________ cm

(e) Find the maximum volume of the box.

Maximum volume = ____________ cm^3.