Section 4.2 Applications of Extrema (Minimum Homework: 1, 3, 5)

1) A campground owner has 1000 meters of fencing. He wants to enclose a rectangular field with the fence that he has. Let W represent the width of the field and L represent the length of the field. Find the dimensions that maximize the enclosed area.

a) Write an equation for the length of the field.

b) Write an equation for the area of the fenced in field.

c) Find the domain of the area equation that was created in part b.
(This domain will be of the form: $\# \leq W \leq \#$)

d) Find the value of w leading to the maximum area

e) Find the value of L leading to the maximum area

f) Find the maximum area.

2) A campground owner has 5000 meters of fencing. He wants to enclose a rectangular field with the fence that he has. Let W represent the width of the field and L represent the length of the field. Find the dimensions that maximize the enclosed area.

a) Write an equation for the length of the field.

b) Write an equation for the area of the fenced in field.

c) Find the domain of the area equation that was created in part b.
(This domain will be of the form: $\# \leq W \leq \#$)

d) Find the value of w leading to the maximum area

e) Find the value of L leading to the maximum area

f) Find the maximum area.

3) A campground owner has 1000 meters of fencing. He wants to enclose a rectangular field bordering a river, with no fencing needed along the river, and let W represent the width of the field and L represent the length of the field. Find the dimensions that maximize the enclosed area.

Make W be the side of the fence that is perpendicular to the river so that two widths and one length will need to be constructed.

a) Write an equation for the length of the field

b) Write an equation for the area of the field.

c) Find the domain of the area equation that was created in part b.
(This domain will be of the form: $\# \leq W \leq \#$)

d) Find the value of w leading to the maximum area

e) Find the value of L leading to the maximum area

f) Find the maximum area.

4) A campground owner has 4000 meters of fencing. He wants to enclose a rectangular field bordering a river, with no fencing needed along the river, and let W represent the width of the field and L represent the length of the field. Find the dimensions that maximize the enclosed area.

Make W be the side of the fence that is perpendicular to the river so that two widths and one length will need to be constructed.

a) Write an equation for the length of the field

b) Write an equation for the area of the field.

c) Find the domain of the area equation that was created in part b.
(This domain will be of the form: $\# \leq W \leq \#$)

d) Find the value of w leading to the maximum area

e) Find the value of L leading to the maximum area

f) Find the maximum area.

5) An open box with a square base is to be made from a square piece of cardboard 10 inches on a side by cutting out a square (x inches by x inches) from each corner and turning up the sides.

a) Sketch a diagram that models the problem.
b) Write an equation for the volume of the box.
c) Find the domain of the volume equation created in part b.
(This domain will be of the form: $\# \leq x \leq \#$)
d) Find the value of x that makes the volume the largest.
e) Find the maximum volume.

6) An open box with a square base is to be made from a square piece of cardboard 12 inches on a side by cutting out a square (x inches by x inches) from each corner and turning up the sides.

a) Sketch a diagram that models the problem.
b) Write an equation for the volume of the box.
c) Find the domain of the volume equation created in part b.
(This domain will be of the form: $\# \leq x \leq \#$)
d) Find the value of x that makes the volume the largest.
e) Find the maximum volume.

7) An open box is to be made by cutting a square corner of a 20 inch by 20 inch piece of metal then folding up the sides. What size square should be cut from each corner to maximize volume?

a) Sketch a diagram that models the problem.
b) Write an equation for the volume of the box.
c) Find the domain of the volume equation created in part b.
(This domain will be of the form: $\# \leq x \leq \#$)
d) Find the value of x that makes the volume the largest.
e) Find the maximum volume.

8) An open box is to be made by cutting a square corner of a 9-inch by 9-inch piece of metal then folding up the sides. What size square should be cut from each corner to maximize volume?

a) Sketch a diagram that models the problem.
b) Write an equation for the volume of the box.
c) Find the domain of the volume equation created in part b.
(This domain will be of the form: $\# \leq x \leq \#$)
d) Find the value of x that makes the volume the largest.
e) Find the maximum volume.