Extra Practice Problems

1. A veterinarian has 100 ft. of fencing and wishes to construct five dog runs by first building a fence around a rectangular region, and then subdividing that region into five smaller rectangles by placing four more fences in parallel. What dimensions of the region will maximize the total area?

2. A rectangular plot of land will be bounded on one side by a river and on the other three sides by a single–strand electric fence. With 800 ft. of wire, what is the largest area you can enclose?

3. At 1:00 PM, Ship A is 30 mi. due South of Ship B, and is sailing North at 15 mph. If B is sailing West at 10 mph, find the time at which the distance between the ships is minimal.

4. A circular cylindrical container, open at the top, and having a capacity of 24 in^3 is to be made. If the cost of the material for the bottom of the container is three times that used for the curved part, find the dimensions that will minimize cost.

5. A rectangular field is to be fenced off along a river and no fence is required along the river. If the material for the fence costs $4.00 per foot for the ends and $6.00 per foot for the side parallel to the river, find the dimensions of the largest possible area that can be enclosed with $1,800.00 worth of fence.

6. An 8 foot long ladder is leaning against a wall. The top of the ladder is sliding down the wall at the rate of 2 feet per second. How fast is the bottom of the ladder moving along the ground at the point in time when the bottom of the ladder is 4 feet from the wall?
7. A boat is being pulled toward a dock by means of a rope attached to the front tip of the bow. Initially there are 30 feet of rope out and the rope is taught and being reeled in by a circular device the top of which is 10 feet higher than the point where the rope is attached to the boat. This circular device has a radius of 1 foot and turns at the rate of one revolution every pi seconds. How fast is the boat moving along the water when there are 15 feet of rope out?
8. A circle starts out with a radius of 1 cm. (at time t = 0) and begins growing. The area of the circle is increasing at the rate of 2 cm^2 per sec. Find the rate of change of the radius of the circle when the radius is 5 cm.
9. Find the rate of change of the radius of a sphere at the point in time when the radius is 6 feet if the volume is increasing at the rate of 8 pi cubic feet per second.
10. Find the rate of change of the volume of a cylinder when its radius is 6 feet if its height is always (3/2) times its radius and its radius is increasing at the rate of 2 feet per minute.