Chapter 4:4: Optimization and Modeling

Calculus I

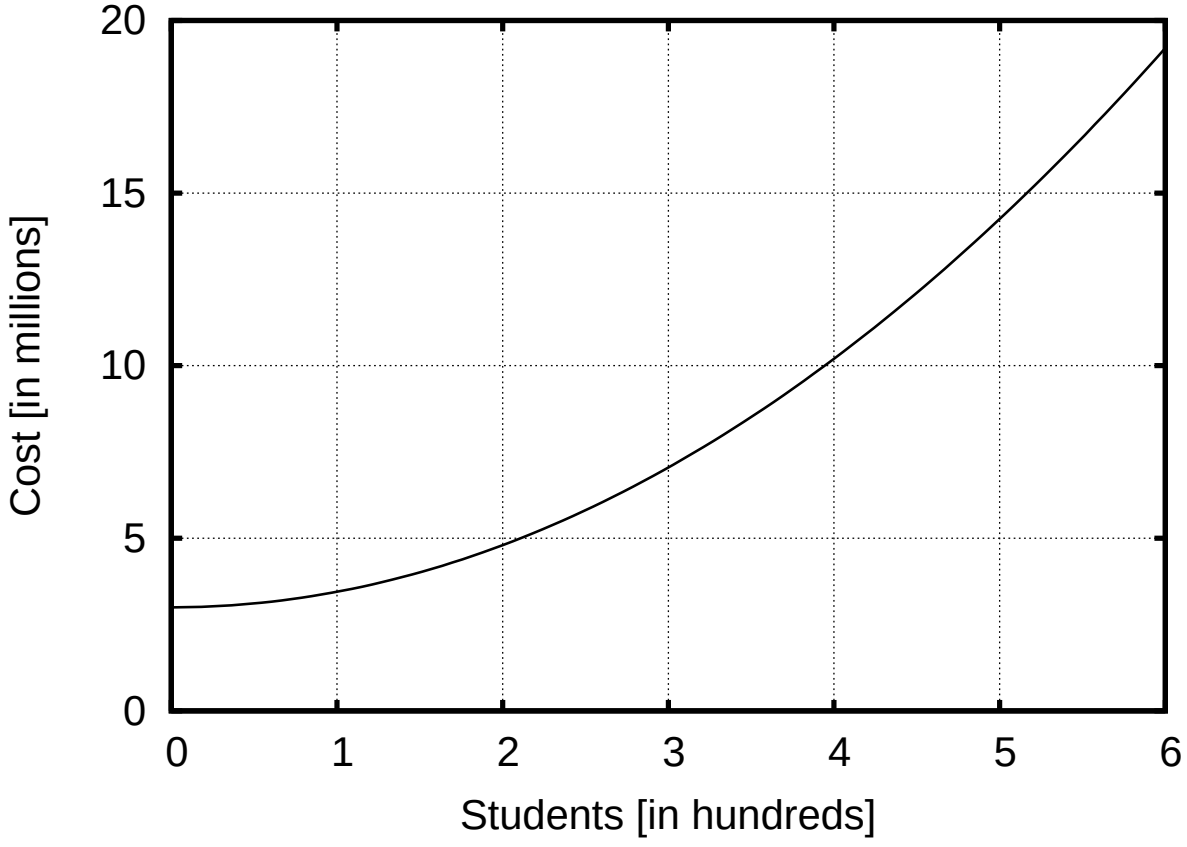
College of the Atlantic. November 7, 2024

1. In the figure is shown a plot of the cost of running a school as a function of the number of students.

   (a) What is the average cost per student if the enrollment is 100?

   (b) What is the average cost per student if the enrollment is 500?

   (c) What number of students leads to the lowest average cost per student?



2. You recently acquired three alpacas and need to fence in a pasture so they don't wander off. Fortunately, you have a tall stone wall along one side of your property. So you'll need to build three walls, not four, to produce a nice rectangular field. You can afford 100 meters of fencing material. What dimensions should your field be so as to maximize the area available to the alpacas?

3. You have a piece of wire of length L. You wish to use this wire to make a rectangle. What dimensions for the rectangle will maximize the area?

4. What point along the curve $y = \sqrt{x}$ is closest to the point $(4, 0)$?

5. You have a piece of wire of length L. You will cut this wire into two pieces. You will use one of the pieces of wire to make a circle and the other piece of wire to make a square. How should you cut the wire so that the resulting area of the two shapes is maximized?