Math 115:
Answers to Extra Optimization Problems from 4.3

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1). The smallest possible sum is $2(24^2)$.

2). She can minimize costs by ordering 40 computers.

3). The rectangle should be formed as a square to maximize area...it does not matter what $L$ is.

4). To maximize the central rectangular area, the dimensions should be $\frac{200}{\pi}$ meters by 100 meters. To maximize the total interior of the track, the rectangle in the middle should be completely absent (it is zero by $\frac{400}{\pi}$), so that the track is a perfect circle.

5). To minimize the area, should make a cut at $\frac{8}{4 + \pi}$ meters, and use that piece to make the square. To maximize, don’t cut at all: it should be all circle.

6.) When width equals length, the dimensions should be 52.6 cm by 52.6 cm by 52.6 cm to maximum volume; in that case, the volume is 146,085.6 cubic centimeters. When width is twice the length, the dimensions should be 35.11 by 70.22 by 52.67 (all in cm); then the volume is 129,849.5 cubic centimeters.

7.) You should make 12 pieces of equal length .5 m.

8.) To minimize surface area, dimensions should be 1.14 m by 2.29m by 0.763 m.

9. To use the least amount of metal, the Radius should be 4.3 cm, and height 8.6 cm. The cost is minimized (when top and bottom material is twice as expensive) when the radius is $\frac{5}{\pi\sqrt{7}}$ cm and the height is $\frac{20}{\pi\sqrt{7}}$ cm.
10. The closest point is \((1/2, 1/\sqrt{2})\).

11. The farmer should plant 60 trees to maximize yield. (Note: this was a critical point where derivative did not exist.)

12. Driving at a speed of 50 km/hr minimizes the cost of gas.