12 | **estimate area**

Right handed Riemann Sum:

$$0.5 + 4 + 10 + 13 + 10 + 0 = 37.5$$

13 | **estimate area again**

$$4(200 + 2700 + 1100 + 4000 + 200) = 32800$$

14 | **area between curves**

$$\int_0^{10} 2200e^{0.024t}dx - \int_0^{10} 1360e^{0.018t}dx = \frac{1}{0.024}2200e^{0.024t} - \frac{1}{0.018}1360e^{0.018t}$$

$$\implies \quad \frac{1}{0.024}2200e^{0.24} - \frac{1}{0.018}1360e^{0.18} - \frac{1}{0.024}2200 + \frac{1}{0.018}1360 \quad \approx 9964$$

15 | **meaning of area**

The shaded region represents the profit made between producing 50 units and 100 units.

16 | **slicing pizza into three using parallel cuts**

The problem of placing slices is the same if we only worry about the top half of the pizza. Thus, we can choose some x for the first slice s.t.

$$2\int_{-7}^{x} \sqrt{7^2 - t^2}dt = \int_{x}^{7} \sqrt{7^2 - t^2}dt$$

$$2\int_{-7}^{x} \sqrt{7^2 - t^2}dt - \int_{x}^{7} \sqrt{7^2 - t^2}dt = 0$$

$$2\int_{-7}^{x} \sqrt{7^2 - t^2}dt + \int_{7}^{x} \sqrt{7^2 - t^2}dt = 0$$

$$2\left(\int_{0}^{x} \sqrt{7^2 - t^2}dt - \int_{0}^{-7} \sqrt{7^2 - t^2}dt\right) + \left(\int_{0}^{x} \sqrt{7^2 - t^2}dt - \int_{0}^{7} \sqrt{7^2 - t^2}dt\right) = 0$$

$$2\left(\int_{0}^{x} \sqrt{7^2 - t^2}dt + \int_{-7}^{0} \sqrt{7^2 - t^2}dt\right) + \left(\int_{0}^{x} \sqrt{7^2 - t^2}dt - \int_{0}^{7} \sqrt{7^2 - t^2}dt\right) = 0$$

$$2\int_{0}^{x} \sqrt{7^2 - t^2}dt + 2\int_{-7}^{0} \sqrt{7^2 - t^2}dt + \int_{0}^{x} \sqrt{7^2 - t^2}dt - \int_{0}^{7} \sqrt{7^2 - t^2}dt = 0$$

$$3\int_{0}^{x} \sqrt{7^2 - t^2}dt + 2\int_{-7}^{0} \sqrt{7^2 - t^2}dt - \int_{0}^{7} \sqrt{7^2 - t^2}dt = 0$$

$$3\int_{0}^{x} \sqrt{7^2 - t^2}dt + \int_{-7}^{0} \sqrt{7^2 - t^2}dt \int_{0}^{7} \sqrt{7^2 - t^2}dt = 0$$