

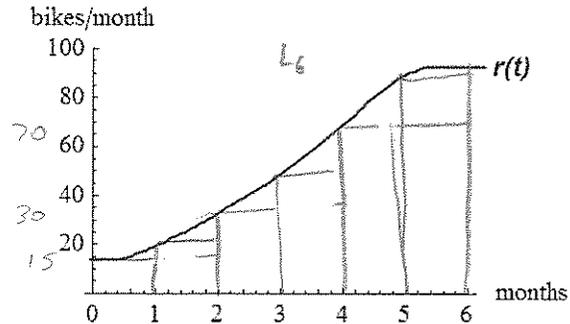
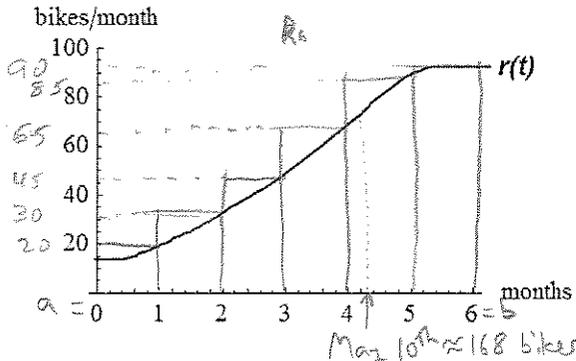
Name: Answer Key

Hour: A

**Quiz 1: Estimation Quiz**

For full credit either explain and fully justify your reasoning or clearly demonstrate all work using proper mathematical notation.

The function  $r(t)$  below is a continuous model that forecasts the demand for bicycles over the first half year of 2009 for Jimmy's Cycle's & More.



Jimmy wants to schedule one shipment of bikes at the beginning of the year such that he has enough bikes to completely satisfy the demand without having too many extra bikes leftover.

- a. Calculate a reasonable over estimate for the number of bikes required?

$$\Delta t = \frac{b-a}{n}$$

$$R_6 = (15 + 20 + 30 + 45 + 65 + 85 + 90) \Delta t = \underline{\underline{335 \text{ bikes}}}$$

ANS

$$R_6 = \sum_{i=1}^6 r(t_i) \Delta t$$

- b. Next select a more accurate estimation technique (while using the same number of subintervals from above) and determine a more accurate estimate.

$$L_6 = (15 + 20 + 30 + 45 + 65 + 85) \Delta t = \underline{\underline{260 \text{ bikes}}}$$

$$L_6 = \sum_{i=1}^6 r(t_{i-1}) \Delta t$$

$$T_6 = \frac{R_6 + L_6}{2} = \frac{\sum_{i=1}^6 r(t_{i-1}) + r(t_i)}{2} \Delta t$$

$$T_6 = \frac{335 + 260}{2} \approx \underline{\underline{298 \text{ bikes}}}$$

ANS.

Jimmy realizes he does not have the room to store anymore than half of the bikes you quote in your over estimate above so he decides to break the order into two equal shipments. The first shipment will still arrive at the beginning of the year but when should he schedule the second to arrive? Explain your reasoning.

$$S = \# \text{ of bikes per shipment} = \frac{335}{2} \approx 168 \text{ bikes}$$

Schedule at the beginning of May because he has to wait until the first shipment is completely exhausted, which occurs when 50% of the area in my first over estimate has accumulated.

Provide an expression, using summation notation, for the exact demand for bikes.

$$\lim_{n \rightarrow \infty} \sum_{i=1}^n r(t_i^*) \Delta t$$