In class assignment
CEE587
Spring 2011

Prof. Goodchild

Continuum Approximation

Demand Varies as a function of Time

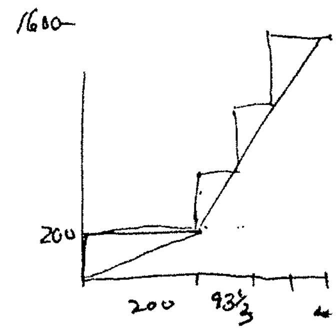
Time is measured in minutes, beginning at 8:00 am. If the fixed cost of a shipment is \$200, and between 8 am and 11:20 am demand is given by t, whereas after 11:20 am it is given by 5t. The waiting cost of an item is \$.01 per minute.

1. Determine the optimal headway before and after 11:20 am.

$$H^*(t) = \sqrt{\frac{2 \cdot 200}{.01 \cdot 1}} = 200 \text{ min.}$$

2. Determine the optimal headway after 11:20 am.

$$H^*(t) = \sqrt{\frac{2 \cdot 200}{.01 \cdot 5}} \cong 89 \text{ min.}$$



3. Create a specific shipment schedule for one day.

arrival times : 11:20 , 12:53, 2:26,
4:00 pm.

4. Determine the cost per item using your schedule.

$$= \frac{800 + 853}{1600} = \$1.0333.$$

$$= 4 \cdot 200 = \$800$$

$$= \frac{1}{2}(200 \cdot 200) + \frac{3}{2}(93⅓)(5 \cdot 93⅓) = 85333.\bar{3} \cdot .01$$

$$= \$853.\bar{3}$$

5. Determine the cost per item using the formula for optimal cost per item.

$$\sqrt{\frac{2 \cdot .01 \cdot 200}{1}} = \$2.82, \quad \sqrt{\frac{2 \cdot .01 \cdot 200}{5}} = 1.26$$

\$1.0326

6. Determine the minimum cost per item in the constant demand case. Why are these different?

$$\frac{200\sqrt{\frac{4 \cdot .01 \cdot 200}{1}} + 1400\sqrt{\frac{4 \cdot .01 \cdot 200}{5}}}{1600} \simeq \$1.46$$

(includes inventory