

## HW ENTER / LEAVE PROBLEMS

**2004** (Calculator)

- 1) Traffic flow is defined as the rate at which cars pass through an intersection, measured in cars per minute. The traffic flow at a particular intersection is modeled by the function  $F$  defined by

$$F(t) = 82 + 4 \sin\left(\frac{t}{2}\right) \text{ for } 0 \leq t \leq 30,$$

where  $F(t)$  is measured in cars per minute and  $t$  is measured in minutes.

- a) To the nearest whole number, how many cars pass through the intersection over the 30-minute period?

- b) Is the traffic flow increasing or decreasing at  $t = 7$ ? Give a reason for your answer.

- c) What is the average traffic flow over the time interval  $10 \leq t \leq 15$ ? Indicate units of measure.

- d) What is the average rate of change of the traffic flow over the time interval  $10 \leq t \leq 15$ ? Indicate units of measure.

**2005** (Calculator)

2) The tide removes sand from Sandy Point Beach at a rate modeled by the function  $R$ , given by

$$R(t) = 2 + 5 \sin\left(\frac{4\pi t}{25}\right).$$

A pumping station adds sand to the beach at a rate modeled by the function  $S$ , given by

$$S(t) = \frac{15t}{1 + 3t}.$$

Both  $R(t)$  and  $S(t)$  have units of cubic yards per hour and  $t$  is measured in hours for  $0 \leq t \leq 6$ . At time  $t = 0$ , the beach contains 2500 cubic yards of sand.

a) How much sand will the tide remove from the beach during this 6-hour period? Indicate units of measure.

b) Write an expression for  $Y(t)$ , the total number of cubic yards of sand on the beach at time  $t$ .

c) Find the rate at which the total amount of sand on the beach is changing at time  $t = 4$ .

d) For  $0 \leq t \leq 6$ , at what time  $t$  is the amount of sand on the beach a minimum? What is the minimum value? Justify your answers.