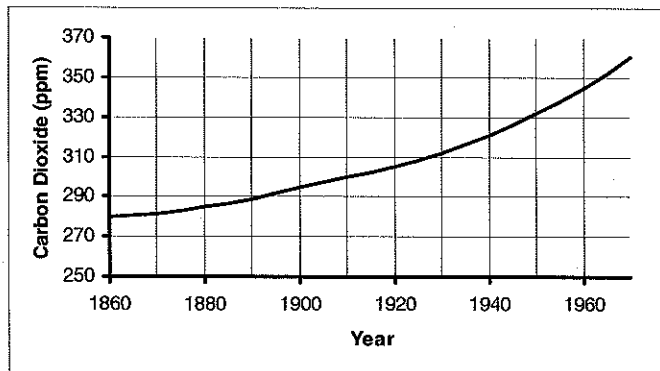


**#13 PRACTICAL INTERPRETATION & ESTIMATION 2.4**

1. Estimate  $P'(1940)$  and give a practical interpretation.  $P$  represents the amount of carbon dioxide (ppm) in the atmosphere,  $t$  represents the year.



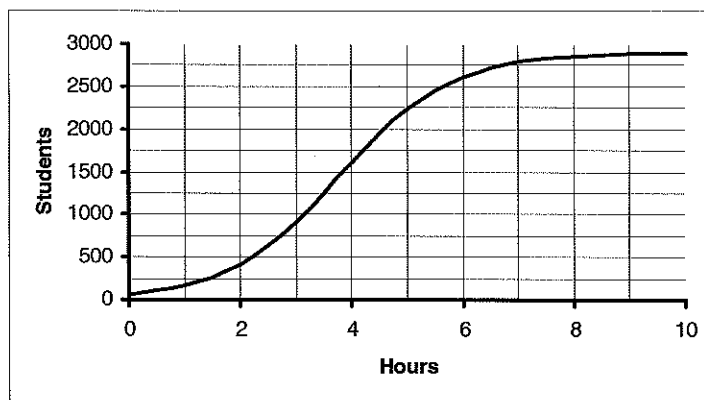
2. The speed of a car in mph can be expressed in terms of the length of a skid mark in feet when brakes are applied. Estimate  $S'(20)$  and give a practical interpretation if  $S(L) = 2\sqrt{5L}$ .
3. Suppose a filter has been designed to remove 100 grams of sediment from a storage tank. Let  $Q(t)$  be the amount of sediment in the tank at time  $t$ .
- A. Estimate  $Q'(3)$  if the filter removes a fixed amount of sediment each hour, say 2.3 grams.
- B. Estimate  $Q'(3)$  if the filter removes a fixed percentage of sediment each hour, say 20 %.
- C. Give a practical interpretation of one of your answers above.



4. Estimate  $L'(35)$  and give a practical interpretation.  $L$  is the light output (millions of lumens) and  $t$  is the time after ignition (milliseconds) of a No. 22 lightbulb.

|                     |   |     |     |     |     |     |     |     |      |     |    |
|---------------------|---|-----|-----|-----|-----|-----|-----|-----|------|-----|----|
| Time after ignition | 0 | 5   | 10  | 15  | 20  | 25  | 30  | 35  | 40   | 45  | 50 |
| Light output        | 0 | 0.2 | 0.5 | 2.6 | 4.2 | 3.0 | 1.7 | 0.7 | 0.35 | 0.2 | 0  |

5. The registrar has put a counter on the RSVP registration telephone lines to count the total number of students registering during the day. A graph of  $N(t)$ , the total number of students who have registered during the  $t$  hours since noon, is given below.



- A. Estimate  $N^{-1}(2000)$  and give an interpretation.
- B. Estimate  $N'(2)$  and give an interpretation.
- C. Estimate coordinates of the inflection point. Explain the significance of this point in terms of the problem.
- D. Sketch a graph of  $N'(t)$ .