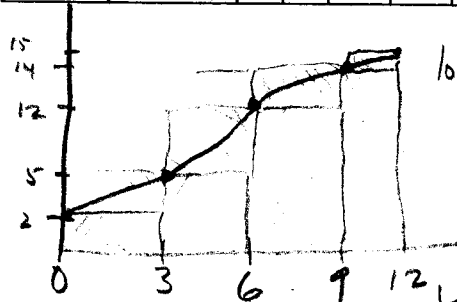


1. The following is data on the velocity of a car taken every 3 seconds. How far does the car travel during the first 12 seconds? Draw the appropriate picture-graph relating your answer to area.

time (secs)	0	3	6	9	12
velocity (ft/sec)	2	5	12	14	15



$$\text{lower sum} = 2 \cdot 3 + 5 \cdot 3 + 12 \cdot 3 + 14 \cdot 3 = 6 + 15 + 36 + 42 = 99$$

$$\text{upper sum} = 2 \cdot 3 + 5 \cdot 3 + 12 \cdot 3 + 14 \cdot 3 + 15 \cdot 3 = 138$$

$$99 \leq \text{area under curve} \leq 138$$

a better approximation might be the average:

$$\frac{99 + 138}{2} = 118.5 \text{ miles}$$

2. Use the first derivative to find all critical points and the second derivative to find all inflection. Label these points on a graph. $f(x) = 3x^4 - 4x^3 + 2$.

$$f'(x) = 12x^3 - 12x^2 = 12x^2(x-1)$$

$$12x^2(x-1) = 0 \text{ when } x = 0, +1 \text{ (crit. pts.)}$$

$$f''(x) = 36x^2 - 24x = 12x(3x-2) = 0 \text{ when } x = 0, \frac{2}{3}$$

$$f' \quad \begin{array}{c} - \quad 0 \quad - \quad 0 \quad + \\ \hline \quad 0 \quad \quad \quad 1 \end{array}$$



$$f'' \quad \begin{array}{c} + \quad - \quad + \quad + \\ \hline \quad 0 \quad \quad \frac{2}{3} \quad 1 \end{array}$$

(inflection pts)