# **Areas and Distances**: Examples

SYMPLIT

1. Use 3 rectangles to find lower and upper estimates for the area under the graph of $f(x) = x^2$ from $x = 0$ to $x = 6$. Sketch the region and the rectangles.

2. The given table provides speedometer readings at 5 second intervals during a 30 second time period.

| Time(s) | Velocity(mph) |
|---|---|
| 0 | 64 |
| 5 | 67 |
| 10 | 68 |
| 15 | 57 |
| 20 | 43 |
| 25 | 50 |
| 30 | 58 |

   (a) Estimate the distance traveled using the velocities at the beginning of each interval

   (b) Estimate the distancee traveled using the velocities at the end of each interval

   (c) Are these estimates upper and lower estimates? Explain.

3. Express as a limit the area under the graph of $f(x) = \ln(\tan x)$ for $\pi/4 \leq x \leq \pi/3$

4. Determine which region has an area equal to the limit: $\lim_{n\to\infty} \sum_{i=1}^{n} \frac{\pi}{2n} \sqrt{\cos\left(\frac{i\pi}{2n}\right)}$

5. Determine which region has an area equal to the limit: $\lim_{n\to\infty} \sum_{i=1}^{n} \frac{5}{n} \left(-2 + \frac{5i}{n}\right)^2$