1. \( f(x) = \begin{cases} 
3x & x < 2 \\
4 + x & 2 \leq x < 4 \\
-2x + 16 & 4 \leq x 
\end{cases} \)

Evaluate \( \int_{-2}^{6} f(x) \, dx \)

Show your work. Graph \( f(x) \) and use geometry.
a) Find $L_6$ and $R_6$ and \( \frac{L_6 + R_6}{2} \) for \( f(x) = 4 - x^2 \) on the interval \([1, 4]\). b

Sketch the rectangles for each of the left and right hand sums.

b) Find \( \lim_{n \to \infty} L_n = \lim_{n \to \infty} R_n = \int_1^4 (4 - x^2)dx \).
3. Evaluate by hand and showing all work \[ \int_{0}^{3} x\sqrt{x^2 + 16} \, dx . \]

4. A marginal cost function is given by \( C'(x) = -0.02x + 15 \). The total cost of producing the first 100 units is $3500.
   a) Find the cost function.
   
   b) Find the average value of the total cost over the interval \([0, 100]\).
   
   c) Find the average cost per unit for the first 100 units.