1. (5 points) Find the average value of the function \( f(x) = \sqrt{x} \) on the interval \([0, 4]\).

\[
\text{Average Value} = \frac{1}{4-0} \int_{0}^{4} \sqrt{x} \, dx = \frac{1}{4} \left[ \frac{2}{3} x^{3/2} \right]_{0}^{4} = \frac{8}{6}
\]

2. (5 points) Using the method of cylindrical shells, set up, BUT DO NOT EVALUATE, an integral which calculates the volume of the solid generated by revolving the region enclosed by the curves \( y = 4x - x^2 \) and \( y = 3 \), about the line \( x = 1 \).

Intersection:

\[
4x - x^3 = 3
\]

\[
x^3 - 4x + 3 = 0
\]

\[
(x-3)(x-1) = 0
\]

\[
x = 1, 3
\]

Vertical Slice

Cylindrical Shell

\[
V = 2\pi \int_{1}^{3} (x-1)(4x-x^2-3) \, dx
\]