A plane area is bounded by the curve \( y^2 = 4x \) and the line \( y = x \).

b) How far from the x-axis is the centroid of the curve?

Centroid:
\[
A \gamma_0 = \int_{y_1}^{y_2} y \, dy
\]

Points of intersection:
\[
y^2 = 4x \quad \text{and} \quad y = x
\]
\[
y^2 = 4y
\]
\[
y^2 - 4y = 0
\]
\[
y(y - 4) = 0
\]
\[
y = 0 \quad \text{and} \quad y = 4
\]
\[
x = 0 \quad \text{and} \quad x = 4
\]
\[x_1 = y^2/4 + \text{parabola}
\]

\[dA = (x_k - x_L) \, dy
\]
\[A = \int_{0}^{4} \left[ 4 - y^2/4 \right] \, dy
\]
\[= \left[ \frac{y^2}{2} - \frac{y^4}{16} \right]_{0}^{4}
\]
\[= \left[ \frac{16}{2} - \frac{16}{16} \right] = \frac{16}{2} = 8 \text{ units}^2
\]

OR:
\[A = \text{A parabolic segment - A triangle}
\]
\[= \frac{1}{2} \times 4 \times 4 - \frac{1}{2} \times 4 \times 4 - \frac{1}{2} \times 4 \times 4 = 8 \text{ units}^2
\]