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

a) Find the area bounded by the curve.

Points of intersection:
\[ y^2 = 4x \quad y = x \]
\[ y^2 = 4y \]
\[ y^2 - 4y = 0 \]
\[ y(y - 4) = 0 \]
\[ y = 0 \quad y = 4 \]
\[ x = 0 \quad x = 4 \]

\[ A = \int_0^4 (y^2 - 4y) \, dy \]
\[ = \left[ \frac{y^3}{3} - 2y^2 \right]_0^4 \]
\[ = \left[ \frac{4^3}{3} - 2 \cdot 4^2 \right] \]
\[ = \frac{64}{3} - 32 \]
\[ = \frac{64 - 96}{3} \]
\[ = \frac{-32}{3} \]
\[ \approx -10.67 \text{ units}^2 \]

OR:
\[ A = A_{\text{parabolic segment}} - A_{\text{triangle}} \]
\[ = \frac{1}{2} \cdot 4 \cdot 4 - \frac{1}{2} \cdot 4 \cdot 4 \]
\[ = 8 - 8 \]
\[ = 0 \text{ units}^2 \]