

Homework Set 23

(sect 7.4: Arc Length)

1. Use the arc length formula to find the length of the curve $y = 5 - 2x$ on $1 \leq x \leq 3$. Check your answer by computing the length of the curve using the distance formula.

Find the length of the curve along the given interval.

2. $y = \ln(\sec x)$, $0 \leq x \leq \pi/4$

3. $x = 1 + 2y^{3/2}$, $0 \leq y \leq 1$

4. $x = 2 + t^3$, $y = 1 + 2t^2$, $0 \leq t \leq 2$

5. Sketch the graph of the curve given by the parametric equation: $x = r \cdot \cos t$, $y = r \cdot \sin t$, $0 \leq t \leq 2\pi$ where r is any positive number. Use the Arc Length Formula to calculate the length of this circle. Show all of your work.

$$x' = \underline{\hspace{2cm}} \qquad y' = \underline{\hspace{2cm}}$$

$$\begin{aligned} \text{Arc Length } L &= \int_0^{2\pi} \sqrt{(\hspace{1.5cm})^2 + (\hspace{1.5cm})^2} dt \\ &= r \int_0^{2\pi} \sqrt{(\hspace{1.5cm})^2 + (\hspace{1.5cm})^2} dt \quad \text{by factoring out } r^2 \\ &= \end{aligned}$$

Is this the expected value for the circumference of the circle?