Practice Assessment 20
Arc Length

These **practice problems** are designed to help you **prepare for our course exams** and **assess your understanding** of the course material at the expected level. Aim to complete them **in class, during tutoring, office hours, or on your own**, and try to solve them **without notes or a calculator**, just like on the **actual exams**. Remember, **practice makes perfect**, so don't hesitate to **ask for help** if you get stuck.

If f has a continuous derivative on $[a, b]$, the length of the graph of $y = f(x)$ from $(a, f(a))$ to $(b, f(b))$ is given by

$$L = \int_a^b \sqrt{1 + (f'(x))^2}\, dx$$

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1. Find the length of the arc of the graph $y = x^{3/2}$ between $(1, 1)$ and $(4, 8)$.

2. Find the length of the arc of the graph $y = \dfrac{1}{4}x^4 + \dfrac{1}{8x^2}$ for $1 \le x \le 2$.

3. Sketch the piecewise defined function $f(x) = \begin{cases} \sqrt{4 - x^2} & x \leq 2 \\ 4x - 4 & x \geq 2 \end{cases}$ and use geometric calculations such as the circumference of a circle and the distance of line a segment to find the arc length of $f(x)$ from $x = 0$ to $x = 6$.

4. Find the length of the arc of the graph of the equation

$$6xy - y^4 - 3 = 0$$

from $(19/12, 2)$ to $(14/3, 3)$.