

MATH 22 PRACTICE EXAM ON ARCLENGTH

Name:

Section:

Instructions:

- (1) Books, notes, and calculators are not permitted.
- (2) Simplify as instructed. On some problems, unsimplified correct answers will not receive full credit.
- (3) Show your work as instructed. On some problems, correct answers without justification will not receive full credit.

(1)

(2)

(3)

(4)

(5)

Total

Problem 1. (5 pts.) Circle the correct answer. There will be no partial credit. You do not need to show your work.

Which of the following is the length of the curve $y = \sqrt{25 - x^2}$ from $x = -5$ to $x = 5$?

- A. 5.
- B. 10.
- C. 5π .
- D. 10π .
- E. None of these.

Problem 2. (5 pts.) Circle the correct answer. There will be no partial credit. You do not need to show your work.

Which of the following integrals gives the length of the parabola $y = \frac{x^2}{2}$ from $x = 0$ to $x = 1$?

- A. $\int_0^1 \sec \theta \, d\theta$.
- B. $\int_0^1 \sec^3 \theta \, d\theta$.
- C. $\int_0^{\pi/4} \sec \theta \, d\theta$.
- D. $\int_0^{\pi/4} \sec^3 \theta \, d\theta$.
- E. None of these.

Problem 3. (15 pts.) (a) Use the Pythagorean Theorem to find the distance from $(1, 2)$ to $(3, 8)$.

(b) Find the equation of the line that passes through the points in part (a). Express your answer in the form $y = mx + b$.

(c) Use the arclength formula and part (b) to find the distance between the two points.

Problem 4. (15 pts.) Find the length of the curve

$$y = \frac{4x^{3/2}}{3}$$

from $x = 0$ to $x = 2$. Show your work and express your answer as a simplified fraction.

Problem 5. (15 pts.) (a) Set up but do not evaluate an integral which gives the length of the curve $y = \sin x$ from $x = 0$ to $x = \pi$.

(b) Use the trapezoid rule, with two trapezoids, to estimate the integral in part (a). Show your work and simplify your answer.

Problem 6. (15 pts.) (a) Set up but do not evaluate an integral which gives the length of the curve $y = x^3$ from $x = 0$ to $x = 2$.

(b) Use Simpson's with two parabolas ($n = 4$) to estimate the integral in part (a) as a sum of real numbers. Show your work. You do not need to simplify your answer.