

**MATH 22 PRACTICE EXAM ON TRIGONOMETRIC
SUBSTITUTION**

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

Which of the following indefinite integrals is easy to evaluate without integration by parts, partial fractions, or trigonometric substitution?

A. $\int \sqrt{x^2 - 25} \, dx.$

B. $\int x\sqrt{x^2 - 25} \, dx.$

C. $\int x^2\sqrt{x^2 - 25} \, dx.$

D. $\int x^3\sqrt{x^2 - 25} \, dx.$

E. None of these.

Problem 2. (10 pts.) Circle the correct answer. There will be no partial credit. You do not need to show your work.

The function

$$\frac{1}{\sqrt{x^2 - 25}}$$

is defined only when $x > 5$ or $x < -5$. If we use the trigonometric substitution $x = 5 \sec \theta$ to integrate this function, what values of θ correspond to the above values of x ?

A. $0 < \theta < \pi.$

B. $-\pi/2 < \theta < \pi/2.$

C. $0 < \theta < \pi/2, \quad \pi/2 < \theta < \pi.$

D. $-\pi/2 < \theta < 0, \quad 0 < \theta < \pi/2.$

E. None of these.

Problem 3. (15 pts.) (a) On one set of axes, graph the circle $x^2 + y^2 = 4$ and the vertical lines $x = \sqrt{2}$, $x = \sqrt{3}$.

(b) Find the area of the region which lies inside the above circle and between the vertical lines. Show your work and simplify your answer.

Problem 4. (15 pts.) Evaluate the indefinite integral

$$\int \frac{x^3 dx}{\sqrt{x^2 - 16}}$$

and state your answer as a function of x . Show your work and simplify your answer.

Problem 5. (15 pts.) Evaluate the indefinite integral

$$\int x^5 \sqrt{x^2 + 9} \, dx$$

and state your answer as a function of x . Show your work and simplify your answer.