

Name KEY Date _____ Period _____

Worksheet 10.1—Trig Substitution

Show all work on a separate sheet of paper. No Calculator

Free Response & Short Answer

1. Evaluate $\int \frac{dx}{\sqrt{x^2 + 25}}$

$$\int \frac{5 \sec^2 \theta d\theta}{\sqrt{25 \tan^2 \theta + 25}}$$

$$\int \frac{5 \sec^2 \theta d\theta}{\sqrt{25(\tan^2 \theta + 1)}}$$

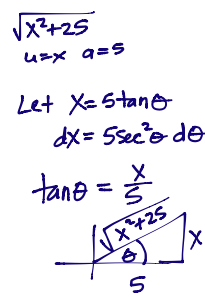
$$\int \frac{5 \sec^2 \theta}{5\sqrt{\sec^2 \theta}} d\theta$$

$$\int \frac{\sec^2 \theta}{\sec \theta} d\theta$$

$$\int \sec \theta d\theta$$

$$\ln|\sec \theta + \tan \theta| + C$$

$$\ln\left|\frac{\sqrt{x^2 + 25}}{5} + \frac{x}{5}\right| + C$$



2. Evaluate $\int \frac{dx}{x^2 \sqrt{x^2 - 36}}$

$$\int \frac{6 \sec \theta \tan \theta d\theta}{(6 \sec \theta)^2 \sqrt{(6 \sec \theta)^2 - 36}}$$

$$\int \frac{6 \sec \theta \tan \theta}{36 \sec^2 \theta \sqrt{36(\sec^2 \theta - 1)}} d\theta$$

$$\int \frac{\tan \theta}{6 \sec \theta \cdot 6 \sqrt{\tan^2 \theta}} d\theta$$

$$\int \frac{\tan \theta}{36 \sec \theta \cdot \tan \theta} d\theta$$

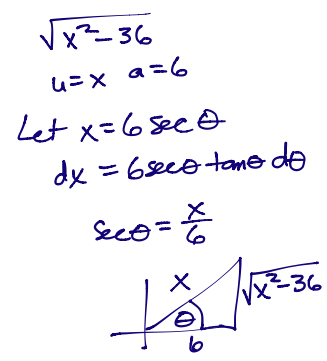
$$\frac{1}{36} \int \frac{1}{\sec \theta} d\theta$$

$$\frac{1}{36} \int \cos \theta d\theta$$

$$\frac{1}{36} \sin \theta + C$$

$$\frac{1}{36} \cdot \frac{\sqrt{x^2 - 36}}{x} + C$$

$$\frac{\sqrt{x^2 - 36}}{36x} + C$$



Multiple Choice

C 3. When trigonometric substitution is used to evaluate $\int x^4 \sqrt{1+x^2} dx$, which of the following integrals is obtained after the substitution?

- (A) $\int \sec^4 \theta \tan \theta d\theta$
- (B) $\int \sin^4 \theta \cos^2 \theta d\theta$
- (C) $\int \tan^4 \theta \sec^3 \theta d\theta$
- (D) $\int \sin 4\theta \cos 2\theta d\theta$
- (E) $\int \tan^2 \theta \sec \theta d\theta$

$$\int x^4 \sqrt{1+x^2} dx$$

$$\int (\tan \theta)^4 \sqrt{1+(\tan \theta)^2} \cdot \sec^2 \theta d\theta$$

$$\int \tan^4 \theta \sqrt{\sec^2 \theta} \cdot \sec^2 \theta d\theta$$

$$\int \tan^4 \theta \cdot \sec \theta \cdot \sec^2 \theta d\theta$$

$$\int \tan^4 \theta \cdot \sec^3 \theta d\theta$$

