

Math 1552
Spring 2019
Quiz 4 6:00
February 14, 2019
Time Limit: 15 Minutes

Name (Print): _____

Canvas email: _____

Teaching Assistant/Section: _____

GT ID:

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By signing here, you agree to abide by the **Georgia Tech Honor Code**: *I commit to uphold the ideals of honor and integrity by refusing to betray the trust bestowed upon me as a member of the Georgia Tech Community.*

Sign Your Name: _____

This quiz contains 2 pages (including this cover page) and 1 problems. Check to see if any pages are missing. Enter all requested information on the top of this page.

You may *not* use your books, notes, or any calculator on this quiz.

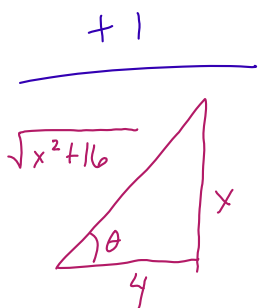
You are required to show your work on each problem on this quiz. The following rules apply:

- **If you use a “fundamental theorem” you must indicate this** and explain why the theorem may be applied.
- **Organize your work**, in a reasonably neat and coherent way, in the space provided. Work scattered all over the page without a clear ordering will receive very little credit.
- **Mysterious or unsupported answers will not receive full credit.** A correct answer, unsupported by calculations, explanation, or algebraic work will receive no credit; an incorrect answer supported by substantially correct calculations and explanations might still receive partial credit.
- Please circle or box in your final answer.

Problem	Points	Score
1	20	
Total:	20	

1. (20 points) Evaluate the integral using trigonometric substitution.

$$\int \frac{\sqrt{x^2 + 16}}{x^4} dx$$



$$x = 4 \tan \theta \quad +2$$

$$dx = 4 \sec^2 \theta d\theta \quad +2$$

$$\sqrt{x^2 + 16} = 4 \sec \theta \quad +2$$

+2

$$\int \frac{4 \sec \theta \cdot 4 \sec^2 \theta d\theta}{4^4 \cdot \tan^4 \theta} = \frac{1}{16} \int \frac{\sec^3 \theta d\theta}{\tan^4 \theta}$$

$$\tan \theta = \frac{\sin \theta}{\cos \theta}$$

$$\sec \theta = \frac{1}{\cos \theta} \quad +2$$

$$= \frac{1}{16} \int \frac{\cos^4 \theta}{\cos^3 \theta \sin^4 \theta} d\theta = \frac{1}{16} \int \frac{\cos \theta}{\sin^4 \theta} d\theta$$

$$u = \sin \theta \quad du = \cos \theta d\theta \quad \left. \vphantom{\int} \right\} +3$$

$$= \frac{1}{16} \int \frac{1}{u^4} du = \frac{1}{16} \cdot \frac{u^{-3}}{-3} + C = \frac{-1}{48 \sin^3 \theta} + C \quad +2$$

$$\sin \theta = \frac{x}{\sqrt{x^2 + 16}} \leadsto \frac{1}{\sin \theta} = \frac{\sqrt{x^2 + 16}}{x} \quad +2$$

$$= \frac{-\frac{(x^2 + 16)^{3/2}}{48 x^3}}{+1} + C \quad +1$$