

PRINT Your Name: \_\_\_\_\_

**Quiz 4 — February 7, 2014 – Section 7 – 12:00 – 12:50**

**Remove everything from your desk except this page and a pencil or pen.**

The solution will be posted soon after the quiz is given.

**Circle** your answer. **Show your work.** Your work must be correct and coherent. **Check your answer.**

The quiz is worth 5 points.

Find  $\int \frac{1}{\sqrt{x^2+16}} dx$ .

**Answer:** Let  $x = 4 \tan \theta$ . It follows that  $x^2 + 16 = 16 \sec^2 \theta$  and  $dx = 4 \sec^2 \theta d\theta$ . The original problem is equal to

$$\int \frac{4 \sec^2 \theta}{4 \sec \theta} d\theta = \int \sec \theta d\theta = \ln |\sec \theta + \tan \theta| + C$$

$$= \ln \left| \frac{\sqrt{x^2+16}}{4} + \frac{x}{4} \right| + C = \ln |\sqrt{x^2+16} + x| - \ln 4 + C = \boxed{\ln |\sqrt{x^2+16} + x| + K},$$

where  $K$  is the constant  $C - \ln 4$ .

Check. The derivative of

$$\ln(\sqrt{x^2+16} + x)$$

is

$$\frac{\frac{2x}{2\sqrt{x^2+16}} + 1}{\sqrt{x^2+16} + x} = \frac{x + \sqrt{x^2+16}}{(\sqrt{x^2+16} + x)\sqrt{x^2+16}} = \frac{1}{\sqrt{x^2+16}}. \checkmark$$