Prof. Haiman Math 1A—Calculus Fall, 2006

Quiz 13 solutions—version B

Name _____ Student ID Number _____

1. Evaluate the indefinite integral

$$\int \sec^2(\pi x)\, \tan(\pi x)\, dx$$

Let $u = \tan(\pi x)$, so $du = \pi \sec^2(\pi x)\, dx$. Then

$$\int \sec^2(\pi x)\, \tan(\pi x)\, dx = \frac{1}{\pi} \int u\, du = \frac{u^2}{2\pi} + C = \frac{\tan^2(\pi x)}{2\pi} + C$$

2. Find constants a, b and k such that

$$\int_{-1}^{1} \sin e^{3x}\, dx = k \int_a^b \frac{\sin x}{x}\, dx.$$

Let $u = e^{3x}$, so $x = (\ln u)/3$, and $dx = du/(3u)$. Then

$$\int_{-1}^{1} \sin e^{3x}\, dx = \int_{e^{-3}}^{e^3} \frac{\sin u}{3u}\, du.$$

Therefore $a = e^{-3}$, $b = e^3$, and $k = 1/3$.