Quiz 12 solutions—version A

Name _____   Student ID Number _____

1. Compute the definite integral

$$\int_0^\pi |\cos x| \, dx$$

Break the interval of integration into two pieces according to the sign of $\cos x$:

$$\int_0^\pi |\cos x| \, dx = \int_0^{\pi/2} \cos x \, dx + \int_{\pi/2}^\pi (-\cos x) \, dx$$
$$= \sin x]_0^{\pi/2} - \sin x]_{\pi/2}^\pi$$
$$= 1 - (-1) = 2.$$

2. Find the derivative $f'(x)$ of the function

$$f(x) = \int_0^{\sqrt{x}} \tan u^2 \, du$$

Let $g(x) = \int_0^x \tan u^2 \, du$. Then $g'(x) = \tan x^2$ by the fundamental theorem of calculus. Since $f(x) = g(\sqrt{x})$, we get $f'(x) = (\tan x)/(2\sqrt{x})$ by the chain rule.