

Worksheet 1

Math 1572H, 24 January 2006

1. Orthogonality of sine functions. Let m and n be positive integers. Show that

$$\frac{1}{\pi} \int_{-\pi}^{\pi} \sin(mx) \sin(nx) dx = \begin{cases} 0 & \text{if } m \neq n \\ 1 & \text{if } m = n. \end{cases}$$

2. Trig substitution fun. Evaluate the integral

$$\int_0^2 \frac{x^3 dx}{\sqrt{x^2 + 4}}.$$

3. Oh yeah. Evaluate the integral

$$\int \frac{(x-1) dx}{\sqrt{x^2 + 4x + 5}}.$$