

Worksheet 2, Math 1B

Trigonometric Substitution

Monday, January 23, 2012

1. Evaluate the integral

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

using trigonometric substitution. Then evaluate it using integration by parts.

2. Evaluate the following integrals:

(a) $\int_0^1 x\sqrt{x^2+4} dx$

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

(c) $\int_0^a x^2\sqrt{a^2-x^2} dx$

(d) $\int \frac{x^2}{9-25x^2} dx$

(e) $\int \frac{1-\tan^2 x}{\sec^2 x} dx$

(f) $\int_0^{\pi/2} \frac{\cos t}{\sqrt{1+\sin^2 t}} dt$

3. A torus is generated by rotating the circle $x^2 + (y - R)^2 = r^2$ about the x -axis. Find the volume enclosed by the torus.