

Calculus: Homework 9

November 22nd, 2007

1. Evaluate the following integral

$$\int_{-1}^1 (1 + \sqrt{1 - x^2}) dx.$$

2. Let f be a continuous function on $[a, b]$. Show that there exists a point $c \in [a, b]$ with

$$\int_a^b f(x) dx = f(c)(b - a).$$

3. Find

$$\lim_{x \rightarrow 0} \frac{1}{x^3} \int_0^x \frac{t^2}{t^4 + 1} dt.$$

4. Find

$$\frac{d}{dx} \int_{\sin x}^{3x+1} t(1 + t^2) dt.$$

5. Find

$$\int \frac{(t^2 - a)(t^2 - b)}{\sqrt{t}} dt.$$