

24 April 2007

Quiz 10: Math 135, Sections 01-03

1. Fill in the blanks. f and g are functions, u is a variable, and a, b, c are given constants.

$$\begin{aligned}\int [f(u) + g(u)] du &= \int f(u) du + \int g(u) du \\ \int [af(u) + bg(u)] du &= a \int f(u) du + b \int g(u) du \\ \frac{d}{du}(c) &= 0 \\ \int 0 du &= 0\end{aligned}$$

2. At what point C , ($C > 0$) is the area under the curve of the function x^2 in the interval $[0, C]$ the same as the area under the curve of the function x^3 in the same interval?

The area under the curve of x^2 in the interval $[0, C]$ is

$$\int_0^C x^2 dx = \left. \left(\frac{x^3}{3} \right) \right|_0^C = \frac{C^3}{3}$$

Likewise, the area under the curve of x^3 in the interval $[0, C]$ is

$$\int_0^C x^3 dx = \left. \left(\frac{x^4}{4} \right) \right|_0^C = \frac{C^4}{4}$$

Therefore, for the two areas to be equal we need

$$\frac{C^3}{3} = \frac{C^4}{4}$$

whose only non-negative solution is $C = \frac{4}{3}$.