MATH 16020 Lesson 1B: Integration by Substitution II

Spring 2021

Warm-up. Evaluate $\int \dfrac{1}{\sqrt{3x+4}}dx$ via the appropriate substitution.

Example 1. Evaluate $\displaystyle\int_{4}^{15} \dfrac{1}{\sqrt{3x+4}}dx$

Example 2. Suppose a strain of bacteria initially has 20 bacteria present and the number of bacteria $N(t)$ at time t (in seconds) has a rate that is modeled by:

$$\frac{t}{\sqrt{3t + 4}}$$

How many bacteria are present 3 seconds later? Round to the nearest number of bacteria.

Example 3. If the area of the region under the curve

$$y = (10x + 5)(x^2 + x)^4$$

and bounded by $x = 0$, $y = 0$, and $x = a$ is 32, and $a > 0$, what is a?

Example 4. The velocity $v(t)$ of a particle moving along the t-axis is given by:

$$v(t) = -3t\sin(t^2)$$

If the particle starts at 11, find the position $s(t)$ at time t.