

# MA 16020 LESSON 2: INTEGRATION BY SUBSTITUTION (WORKSHEET)

**EXAMPLE 4:** If the area of the region under the curve

$$y = \frac{1}{\sqrt{9x + 4}}$$

over the interval  $0 \leq x \leq a$  is 6, then what is  $a$ ?

**Example 5:** It is estimated that  $t$  hours after 8:00 am, the population of a certain bacterial sample will be changing at a rate of:

$$N'(t) = \frac{3t}{\sqrt{t+4}} \quad \text{bacteria per hour.}$$

**Find the increase in the bacteria population from 11:00 am to 1:00 pm.**

**Example 6:** It is estimated that  $t$  – weeks into a semester, the average amount of sleep a college math student gets per day  $S(t)$  at a rate of

$$-\frac{6t}{e^{t^2}} \quad \text{hours per day.}$$

When the semester begins, math students sleep on average of 8.1 hours per day. What is  $S(t)$ , 10 week(s) into the semester?