Math Xb Spring 2004
Worksheet: The Substitution Rule (Day Two)
April 23, 2004

Evaluate the following integrals.

1. $\int x^5 \sqrt{1 + x^2}\, dx$

2. $\int \dfrac{x}{\sqrt[4]{x + 2}}\, dx$

3. $\int \dfrac{1 + x}{1 + x^2}\, dx$

4. $\int \dfrac{x^2}{\sqrt{1 - x}}\, dx$

5. $\int \dfrac{25}{25 + 9x^2}$

6. $\int x^3 (x^2 + 1)^{3/2}\, dx$

7. $\int_0^4 \dfrac{x}{\sqrt{1 + 2x}}\, dx$

8. $\int_0^1 x\sqrt{1 - x^4}\, dx$

9. Breathing is cyclic an a full respiratory cycle from the beginning of inhalation to the end of exhalation takes about 5 seconds. The maximum rate of air flow into the lungs is about 0.5 liters per second. This explains, in part, why the function

$$f(t) = \frac{1}{2}\sin\left(\frac{2\pi t}{5}\right)$$

has often been used to model the rate of air flow into the lungs. Use this model to find the volume of inhaled air in the lungs at time t.