6.2 Constructing Antiderivatives Analytically

Name: Date:

P 35. Find an antiderivative $F(x)$ with $F'(x) = f(x)$ and $F(0) = 0$. Is there only one possible solution?

$$f(x) = \sqrt{x}$$

P 45. Find

$$\int \frac{8}{\sqrt{x}}\, dx$$

P 49. Find

$$\int \left(\sqrt{x^3} - \frac{2}{x} \right) \, dx$$

P 51. Evaluate

$$\int_0^3 (x^2 + 4x + 3) \, dx$$

P 53. Evaluate

$$\int_0^{\pi/4} \sin x \, dx$$

P 61. Water is pumped into a cylindrical tank, standing vertically, at a decreasing rate given at time t minutes by

$$r(t) = 120 - 6t \text{ft}^3/\text{min} \quad \text{for} \quad 0 \leq t \leq 10.$$

The tank has radius 5 ft and is empty when $t = 0$. Find the depth of water in the tank at $t = 4$.

P 69.

(a) Find the exact area between $f(x) = x^3 - 7x^2 + 10x$, the x-axis, $x = 0$, and $x = 5$.

(b) Find $\int_0^5 (x^3 - 7x^2 + 10x)\, dx$ exactly and interpret this integral in terms of areas.

P 77. Find the exact average value of $f(x) = \sqrt{x}$ on the interval $0 \leq x \leq 9$. Illustrate your answer on a graph of $f(x) = \sqrt{x}$.