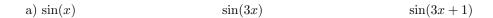# Project 14–Antiderivatives, Indefinite Integrals, and Definite Integrals

1. Find the most general antiderivative for each of the following functions.

a) $\sin(x)$ $\sin(3x)$ $\sin(3x+1)$

b) e^x e^{2x} e^{3x+1}

c) $\dfrac{1}{x}$ $\dfrac{1}{3x}$ $\dfrac{1}{3x+2}$

d) $\sqrt{x}$ $\sqrt{2x}$ $\dfrac{1}{\sqrt{2x}}$

2. Evaluate each of the following indefinite integrals.

a) $\int \dfrac{1}{3x}\,dx$
$\qquad\qquad\qquad\qquad\qquad$ $\int \dfrac{2}{3x+5}\,dx$

b) $\int \dfrac{1}{e^x}\,dx$
$\qquad\qquad\qquad\qquad\qquad$ $\int \dfrac{1}{e^{3x+1}}\,dx$

c) $\int \dfrac{1}{\sqrt{x}}\,dx$
$\qquad\qquad\qquad\qquad\qquad$ $\int \dfrac{2}{\sqrt{3x+5}}\,dx$

3. Find the area under each of the following curves over the indicated interval.

a) $f(x) = \dfrac{1}{3x + 1}$ over $[1, 4]$

b) $g(x) = \dfrac{1}{1 + 4x^2}$ over $[0, \dfrac{1}{2}]$

c) $\dfrac{1}{e^{2x+1}}$ over $[0, 2]$

4. Find the area enclosed by the graph of each of the following curves in the first quadrant.

a) $f(x) = \sqrt{4 - x}$

b) $f(x) = \sqrt[3]{8 - x}$

c) $f(x) = -x^2 + 9$

d) $f(x) = \sqrt{9 - x^2}$

5. Find the area enclosed by each of the curves and above the x-axis.

a) $y = -x^2 + x + 2$

b) $y = x^3 - 6x^2 + 8x$