Name: _____

Antiderivatives and Indefinite Integration

Exercise 1: Find the most general antiderivative of each of the following functions.

a) $g(x) = \frac{1}{x} + e^x$

b) $f(x) = x^3 - 5x$

c) $g(x) = \frac{1}{x^2} + \sqrt{x} - \frac{1}{3}x^{-2/3}$

d) $h(x) = \sec x(\sec x - \tan x)$

Exercise 2: Find f if $f'(x) = x^3 - 5x$ *and* $f(0) = -1$.

Exercise 3: Find all possible functions with the given derivative:

a) $f'(x) = 4$
b) $f'(x) = x$
c) $f'(x) = \cos(x)$

Exercise 4: Suppose that $f'(x) = \frac{1}{2}x$ for all x. Find $f(3)$ if $f(2) = 5$.

Exercise 5: Find the function with the following derivative that passes through the following point:

$f'(x) = 3x + 5$, P(1, 2)

Exercise 6: The acceleration of a moving object is given by a(t) = 12t – 5, where a(t) is in cm per min and t is in min. If the velocity at time t = 1 is 8 cm/min, find an equation for v(t), the velocity as a function of time. Use the equation to find the velocity at the instant t = 3.

Exercise 7: The acceleration function of a body moving on a coordinate line is given by $a = 9.8$. The initial velocity is $v(0) = -3$, and the initial position is $s(0) = 0$. Find the body's position at time t.

Exercise 8: Given $v(t) = 32t - 2$ *and* $s(0.5) = 4$, find $s(t)$.