

Name: \_\_\_\_\_

### HW 3.3 Increasing and Decreasing Functions and the First Derivative Test

Identify the open intervals on which the function is increasing or decreasing.

10.  $y = \frac{x^2}{x+1}$

12.  $h(x) = 27x - x^3$

14.  $y = x + \frac{4}{x}$

15.  $y = x - 2\cos x, \quad 0 < x < 2\pi$

a) Find the critical numbers of  $f$  (if any), b) find the open intervals on which the function is increasing or decreasing, c) apply the First Derivative Test to identify all relative extrema, and d) check your answers on a graphing calculator.

18.  $f(x) = x^2 + 8x + 10$

21.  $f(x) = 2x^3 + 3x^2 - 12x$

24.  $f(x) = (x+2)^2(x-1)$

27.  $f(x) = x^{1/3} + 1$

30.  $f(x) = (x-1)^{1/3}$

33.  $f(x) = x + \frac{1}{x}$

36.  $f(x) = \frac{x+3}{x^2}$

In 12-15, consider the function on the interval  $(0, 2\pi)$ . For each function, a) find the open interval on which the function is increasing or decreasing, b) apply the First Derivative Test to identify all relative extrema, and c) check your answers on a graphing calculator.

40.  $f(x) = \sin x \cos x$

42.  $f(x) = x + 2\sin x$

44.  $f(x) = \sqrt{3}\sin x + \cos x$

46.  $f(x) = \frac{\sin x}{1 + \cos^2 x}$