# Increasing and Decreasing Functions and the First Derivative Test

1. Identify the open intervals on which the function is increasing or decreasing (similar to p.226 #9-20)

$$f(x) = 12x - x^3$$

2. Identify the open intervals on which the function is increasing or decreasing (similar to p.226 #9-20)

$$f(x) = 2x^3 - 3x^2 - 72x + 2$$

3. Identify the open intervals on which the function is increasing or decreasing (similar to p.226 #9-20)

$$f(x) = x + \frac{3}{x-1}$$

4. Identify the open intervals on (0, 2π) on which the function is increasing or decreasing
(similar to p.226 #9-20)

$$f(x) = \sin\frac{x}{2}$$

5. Identify the open intervals on (0, 2π) on which the function is increasing or decreasing
(similar to p.226 #9-20) NEXT TIME SPRING 2013

$$f(x) = 5 - \sin x$$

6. Identify the open intervals on (0, 2π) on which the function is increasing or decreasing
(similar to p.226 #9-20)

$$f(x) = \cos^2\left(\frac{1}{2}x - 1\right)$$

7. Find the critical numbers of f (if any). Find the open intervals on which the function is increasing or decreasing and locate all relative extrema. Use a graphing utility to confirm your results (similar to p.226 #21-58)

$$f(x) = x^3 - 9x^2 + 2$$

8. Find the critical numbers of f (if any). Find the open intervals on which the function is increasing or decreasing and locate all relative extrema. Use a graphing utility to confirm your results (similar to p.226 #21-58)

$$f(x) = x^{\frac{2}{3}} - 2$$

9. Find the critical numbers of f (if any). Find the open intervals on which the function is increasing or decreasing and locate all relative extrema. Use a graphing utility to confirm your results (similar to p.226 #21-58)

$$f(x) = |x+2| - 3$$

10. Find the critical numbers of f (if any). Find the open intervals on which the function is increasing or decreasing and locate all relative extrema. Use a graphing utility to confirm your results (similar to p.226 #21-58)

$$f(x) = \frac{x^2 + 1}{x + 2}$$

11. Find the critical numbers of f (if any). Find the open intervals on which the function is increasing or decreasing and locate all relative extrema. Use a graphing utility to confirm your results (similar to p.226 #21-58)

$$f(x)=\begin{cases} 3x-1, & x\le -1 \\ x^2-2x, & x>-1 \end{cases}$$

12. Find the critical numbers of f (if any). Find the open intervals on which the function is increasing or decreasing and locate all relative extrema. Use a graphing utility to confirm your results (similar to p.226 #21-58) NEXT TIME SPRING 2013

$$f(x) = 5^{x^2-1}$$

13. Find the critical numbers of f (if any). Find the open intervals on which the function is increasing or decreasing and locate all relative extrema. Use a graphing utility to confirm your results (similar to p.226 #21-58)

$$f(x) = \frac{\ln x}{x}$$

14. Find the critical numbers of f (if any). Find the open intervals on which the function is increasing or decreasing and locate all relative extrema. Use a graphing utility to confirm your results (similar to p.226 #21-58)

$$f(x) = x^2 e^{-x}$$

15. Consider the function on the interval $(0, 2\pi)$. For each function, (a) find the open interval(s) on which the function is increasing or decreasing. (b) apply the First Derivative Test to identify all relative extrema, and (c) use a graphing utility to confirm your results
(similar to p.226 #59-66)

$$f(x) = \sqrt{3}\cos x - \sin x$$