

Name \_\_\_\_\_

Period \_\_\_\_\_

AP Calculus BC

Skill Builder: Topic 5.3 – Determining an Interval on Which a Function is Increasing or Decreasing

Topic 5.4 – Using the First Derivative Test to Determine Relative (Local) Extrema

Find the intervals where the function is increasing or decreasing. Use a sign chart to organize your analysis.

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

2.)  $f(x) = x^4 - 8x^2 + 1$

3.)  $f(x) = (x+1)^{\frac{2}{3}}$

4.)  $f(x) = \sin x + \cos x$  on  $(0, 2\pi)$

Find all critical numbers and use the First Derivative Test to classify each as the location of a relative maximum, relative minimum or neither. You may use a chart or a number line to perform your sign tests.

5.)  $f(x) = x^4 + 4x^3 - 2$

6.)  $f(x) = x^2 - 2x^{3/2} + 2$

7.)  $f(x) = \frac{x}{1+x^3}$

8.)  $f(x) = \sqrt{x^3 + 3x^2}$

9.)  $y = \frac{x^2}{4} - \ln x$

10.)  $y = \ln x - x$

11.)  $y = 2x^2 \ln x$

12.)  $y = \frac{\ln x}{2x}$

**13.)**  $y = 2xe^{-x}$

**14.)**  $y = x^2e^{-x}$