AP Calc WS#14 Implicit Differentiation / Technique Name: \_\_\_\_\_\_\_\_\_

Logarithmic differentiation

 y = sin(x)x y = x tan(x)

 $y=\sqrt[5]{\frac{(x-3)^{4}(x^{2}+1)}{(2x+5)^{3}}}$ $y=\frac{x\sqrt{x^{2}+1}}{(x+1)^{{2}/{3}}}$

 Implicit differentiation.

 When it is difficult to solve an equation in terms of y (e.g x2 – 2y3 + 4y = 2) use the following steps to solve it implicitly

 Step 1: Differentiate both sides of the equation with respect to x

 (x2 )' – (2y3 )' + (4y) ' = 2 → 2x – 6y2 dy/dx + 4 dy/dx = 0

 Step 2: Solve the equation for dy/dx

 - 6y2 dy/dx + 4 dy/dx = 2x → dy/dx (- 6y2 + 4) = - 2x → dy/dx = -2x / (-6y2 + 4)

1. Find dy/dx for the followings

 2y = x2 + sin y x2 – xy + y2 = 7 2x3 – 3y2 = 8

2. Find the slope of the circle x2 + y2 = 25 at the point (3, 4). Sketch

3. Find the tangent and normal to the ellipse x2 - xy + y2 = 7 at the point (1, 3). Sketch

4. Find the second derivative of 2x3 – 3y2 = 8

5. A curve in the xy-plane is defined by xy2 – x3y = 6.

a. Find dy/dx

b. Find an equation for the tangent line at each point on the curve with x-coordinate 1

c. Find the x-coordinate of each point on the curve when the tangent line is vertical

d. Sketch the function and its derivative

6. Find the two points where the curve x2 + xy + y2 = 7 crosses the x-axis, and show that the tangents to the curve at these points are parallel. Where the tangent of this curve is parallel to the y-axis?

7. To differentiate parametric equations, we must use the chain rule.

 If x = 2at2 and y = 4at, find dy/dx



 Finding the second derivative is a little trickier. Use

8. Find the tangent line(s) to the parametric curve given by x = t5 – 4t3 ; y = t2 (graph) at (0,4). Then find its second derivative.

9. Given 2x2 – 2xy + y2 – 4 = 0. What type of conic is this, show me its graph on calculator. Find the coordinate of the point where the tangent lines are horizontal? Vertical?

10. Given x2 – 2xy + y2 – 4x = 8. What type of conic is this, show me its graph on calculator. Find the coordinate of the point where the tangent lines are horizontal? Vertical?

 Test on Derivative after this