

## Calculus Review Homework #3

due Thursday 9/13 at 2.30 pm - please write neatly.

Reminder Quiz on Tuesday 9/18 - (make a copy of your solutions to this homework)

- ① Given  $x^3y + xy^3 = 2$ . Find  $y'$  at the point  $(1,1)$
- ② Find equations of the tangent and normal lines  
to  $x^2 + 3xy + y^2 = 5$  at the point  $(1,1)$
- ③ Find a value prescribed by the Law of the Mean  
(aka Mean Value Theorem for Derivatives) given  $y = x^3$  on <sup>the interval</sup>  $[0,6]$
- ④ Let  $f(x) = x^4 + 2x^3 - 3x^2 - 4x + 4$   
Find:
  - Ⓐ the critical values of  $f(x)$  [hint: one root of  $f'(x)$  is  $x=1$ ]
  - Ⓑ the points at which  $f$  has a relative extremum (min or max)
  - Ⓒ the intervals on which  $f$  is increasing or decreasing
- ④ Plot the graph of the curve of  $f$  for  $-3 \leq x \leq 2$
- ⑤ Examine  $y = 3x^4 - 10x^3 - 12x^2 + 12x - 7$  for  
concavity and points of inflection  
[You are not asked to find relative ~~extrema~~<sup>a</sup> / min / max]