



Time: 1 hour

30/11/02

MATH 101  
Quiz II  
First Semester 02-03

1. Find the first derivative for the following functions:

a.  $R = \frac{1}{u^3} + \frac{1}{u^2} - \frac{1}{\sqrt{u}} - \frac{1}{8}$

b.  $Y = (2x+1)^2(x^2+3x)$

c.  $Y = \left(\frac{\sqrt{x}}{x+1}\right)^2$

d.  $S = \sin^3(10 - 3t^2)$

2. a. Find equations for the tangent and normal to the curve  $y = \cot x$  at the point  $(\frac{\pi}{2}, 0)$ .

b. Sketch the curve  $y = \cot x$  for  $(0, \pi)$ . Also sketch the tangent and normal whose equations were found in (a).

3. Find  $\frac{dy}{dt}$  at  $t=0$  if  $y = \cos 2x$  and  $x = \frac{t}{2} + \frac{\pi}{4}$ .

4. Using implicit differentiation, find  $\frac{dy}{dx}$  and  $\frac{d^2y}{dx^2}$  for  $xy + 2x + 3y = 20$ .

5. Given the function  $f(x) = -x^3 + 6x^2 - 9x + 3$ , defined on  $(-\infty, 5]$

a. Find the intervals on which the function is increasing and those on which it is decreasing. Identify (find the coordinates) any local maxima or minima of the function.

b. Find intervals on which the function is concave up and those on which it is concave down. Does  $f(x)$  have a point of inflection? If so, identify it.

c. Sketch the curve of  $f(x)$ .

d. Find the absolute extreme values of the function, if they exist. Discuss.

