

Worksheet 3

ALL work must be shown for solutions of problems submitted for group classwork.

PART I - Sections 3.1 & 3.2

Section 3.1

Problem 1. Differentiate the following functions:

$$(a) F(t) = (2t^{-1} - 3)^2 + e^{2.4}$$

$$(b) G(z) = \frac{A+Bz^{3/2}+Cz^2}{z^2} - 2e^z.$$

Problem 2. Find dy/dx and dy/dt for the equation

$$y = tx^4 - \frac{t}{x}.$$

Problem 3.

(a) For what values of x is the function $f(x) = |x^2 - 9|$ differentiable? Find a formula for f' .

(b) Sketch the graphs of f and f' .

Section 3.2

Problem 4. Find an equation of the tangent line to the curve of the function

$$g(x) = \frac{1+x}{1+e^x}$$

at the point $(0, 1/2)$.

Problem 5. If $r(x) = x/e^x$, find $g^{(n)}(x)$.

Section 3.3

Problem 6. Differentiate the following functions

(a) $f(x) = x \cos(x) \sin(x),$

(b) $h(\theta) = \frac{\theta \sin(\theta)}{1 + \sec \theta}.$

Section 3.4

Problem 8. Find the derivatives of the following functions:

(a) $f(x) = \sqrt{x + \sqrt{x + \sqrt{x}}}$,

(b) $g(z) = e^{z/(z-1)}$

(c) $y = \sin(\theta + \tan(\theta + \cos(\theta)))$.

Problem 7. Find an equation of the tangent line to the curve at the given point.

$$y = xe^{-x^2}, \quad (0, 0).$$