

Worksheet 4

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

PART I - Sections 3.5, 3.6 & 3.9

Section 3.5

Problem 1. Use implicit differentiation to find an equation of the tangent line to the curve of

$$ye^{\sin(x)} = x \cos(y)$$

at the point $(0, 0)$.

Section 3.6

Problem 2. Find the derivative of each of the following two functions:

$$(a) f(x) = \ln(\sin^2(x)), \quad (b) g(x) = \log_4 \left(\sqrt{\frac{1+2x}{1-2x}} \right).$$

Section 3.9

Problem 3.

A street light is mounted at the top of a 15-foot-tall pole. A man 6 feet tall walks away from the pole with a speed of 5 feet/sec along a straight path. How fast is the tip of his shadow moving when he is 40 feet from the pole?

Problem 4. Each side of a square is increasing at a rate of 6 cm/s. At what rate is the area of the square increasing when the area of the square is 16 cm^2 ?

PART II - Sections 4.1, 4.2, 4.3, 4.4, and & 4.5

Section 4.1

Problem 5. Find the absolute maximum and the absolute minimum values of the function

$$f(\theta) = 1 + \cos^2(\theta)$$

in the interval $[\pi/4, \pi]$.

Section 4.2

Problem 6. Show that the equation $2x + \cos(x) = 0$ has exactly one real solution in the interval $[-1, 0]$.

Sections 4.3, 4.4, & 4.5

Problem 7. Sketch the graph of $g(x) = xe^x$.

HINT: To find the horizontal asymptotes of g you need l'Hopital's Rule. Rewrite $g(x) = xe^x = x/e^{-x}$.