UNIVERSITY OF KUWAIT
DEPARTMENT OF MATHS
FIRST SEMESTER 1986/87

MATH 101
INCOMPLETE
TIME: 2 HOURS

Q1: (a) Solve the inequality

$$\frac{x^2 + 2x - 8}{x^2 - 2x + 1} < 0$$

(b) Find an equation of a circle of centre (5 - 7)and tangent to the x-axis

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Q2: Evaluate each of the following limits (if exist)

(a) $\lim_{x \to 2} \dfrac{x^3 [x-2]}{x - 2}$ (b) $\lim_{x \to 2} (x - 2) \sqrt{\dfrac{x^2 + 1}{(x-2)^2}}$

Q3: (a) Assuming that the equation $x^3 y^3 + y x^2 + y + x y^2 = 3$ determines implicitly a differentible function f such that $y = f(x)$. Find an equation for the normal to the curve at (0,3).

(b) Use differentials to approximate $(9.03)^5 + \sqrt{9.03}$

Q4: Find the absolute maximum and absolute minimum of the function

$$f(x) = \int_2^x \left[\frac{16}{\sqrt{t}} - t^{3/2} \right] dt \text{ , in the interval } [2,25]$$

Q5: $\dfrac{x^2 + 4}{x - 1}$

Find the intervals in which the function is increasing or decreasing .
Find the relative extrema of the function .
Discuss concavity and find the points of inflection (if any) .
Determine the vertical and horizontal asymptotes .
Sketch the graph of the function .