Kuwait University | Math 101 | August 4, 1998
Math. & Comp. Sci. Dept. | Second Incomplete Exam. | Time: 75 min.

Calculators and Mobile Phones are not allowed.

1. Find the equation of the normal line to the curve $\frac{x^2}{4}+\frac{y^2}{9}=1$ at the point $(2,0)$

2] Use differentials to find a linear approximation for:

$$\frac{(2.98)^3-4}{\sqrt{298}}$$

3. Sate the mean value theorem, and use it to show that for all $x>0$,

$$(1+x)^{\frac{3}{2}}>1+\frac{3}{2}x$$

4 A square picture having sides 2 ft long is hung on a wall such that the base is 6 ft above the floor If a person whose eye level is 5 ft above the floor looks at the picture and if θ is the angle between the line of sight and the top and bottom of the picture, find the person's distance from the wall a which θ has its maximum value.

5 Given $f(x)=x+\frac{1}{x}$. Show that the local minimum of f is greater than the local Maximum.

6. Evaluate

a) $\int \sqrt{x}\cos\sqrt{x^3}dx$,

b) $\int(5+\frac{1}{x})^2\frac{1}{x^2}dx$.

7 Let

$$f(x)=\frac{x\quad 2}{\sqrt[3]{x^3-4}}$$

a) Find the vertical and horizontal asymptotes for the graph of f (if any).

b) Find the intervals on which f is increasing or decreasing, and find the local extrema of f (if any).

c) Find the intervals on which the graph of f is concave upward or concave downward, and find the points of inflection (if any).

d) Sketch the graph of f.