Kuwait University | Math. 101 | Date: May 21, 1998
Dept. of Math. & Comp. Sci. | Second Midterm Exam. | Duration: 75 Minutes

Calculators are not allowed

Answer the following questions.

1. Let $f(x)=\sin^7(5x^3-2x+1)$. Find $f'(x)$ (5 pts)

2. Use Rolle's theorem to show that the function $f(x)=x\cos x$ has a critical number in the interval $\left(-\frac{\pi}{2},\frac{\pi}{2}\right)$. (3 pts)

3. Use differentials to approximate the value of $\sqrt[3]{28}$. (5 pts)

4. Find the two real numbers whose sum is 100 and their product is maximum. (5 pts)

5. Find $f'(x)$, if .

$$f(x)=\int_{5x}^{x^2}\sin t^2\,dt+\int_0^3\sqrt{t^2+16}\,dt$$ (5 pts)

6. Evaluate the following integrals:

(a) $$\int\frac{dx}{\sqrt{x}(1+\sqrt{x})^{10}}.$$

(b) $$\int_0^1(x^2+2x+1)^5\,dx.$$ (7 pts)

7. Let $$f(x)=\frac{x+1}{x+3}.$$

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

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

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

(d) Sketch the graph of f. (10 pts)

(Good Luck)