Kuwait University | Math. 101 | Date: April 11, 1999
Dept. of Math. & Comp. Sci. | First Exam (Incomplete) | Duration : 75 Minutes

Calculators and Mobile are not allowed

Answer all of the following questions

1. Find the following limit, if it exists:

$$\lim_{x\to 0}\frac{x^2+x\sin x}{x\tan(2x)}$$ (3 pts)

2. Let

$$f(x)=\begin{cases}\dfrac{x\sqrt{x^2+1}}{|x|}+\sin x, & \text{if } x<0,\\ 3x^3-x^2+A, & \text{if } x\geq 0.\end{cases}$$

Find the value of A so that f is continuous for all real numbers. (4 pts)

3. Find the x-coordinates of all the points on the graph of

$$f(x)=3x-2\cos x \quad ,0\leq x\leq 2\pi$$

at which the tangent line is prependicular to the line $x+4y=5$. (3 pts)

4. If

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

find $f'(x)$. (4 pts)

5. An isosceles triangle has equal sides 10 cm long. If the area of the triangle is decreasing at a rate of 2 cm^2/sec. Find the rate of change of the angle θ between the equal sides of the triangle, when $\theta=60^\circ$. (4 pts)

6. Does the graph of the function

$$f(x)=x^{\frac{1}{3}}(4-x),$$

have a cusp, a vertical tangent line? Explain. (4 pts)

7. Find an equation of the tangent line to the graph of

$$x^3y+y^3x=10 \ ,$$

at the point P (1,2). (3 pts)