EXAM 1, MATH 111
27 September, 2004

Notice: Be sure to show all your work. Calculators, books and notes may NOT be used. Write your name in the blue book. WRITE and SIGN the PLEDGE in the blue book.

Problem 1. (20 pts.) Find the limit : $\lim_{t\to 0} \dfrac{\sqrt{t+4}-2}{t}$.

Problem 2. (20 pts.) Find the limit : $\lim_{x\to 0} \dfrac{\cos x \cdot \sin x}{x}$.

Hint: Use $\lim_{x\to 0} \dfrac{\sin x}{x} = 1$.

Problem 3. (20 pts.) Let $f(x) = \begin{cases} 1+x^2 & : \ x > 0 \\ \frac{sinx}{x} & : \ x < 0 \end{cases}$

Is f continuous at the point 0? In case f is discontinuous at 0 is it a removable discontinuity?

Hint: Calculate the left hand limit and the right hand limit of $f(x)$.

Problem 4. (20 pts.) Let $f(x) = \dfrac{2x^3+x}{(x^2+3)^5}$. Find the derivative $f'(x)$.

Problem 5. (20 pts.) Let $y = x^3 + 5x + 3$. Find the equation of the tangent line to this curve at the point $P = (1, 9)$.