國立中央大學八十六學年度碩士班研究生入學試題卷

1) Evaluate　　15%
   a) $\lim_{x\to\infty} x Sin\frac{1}{x}$
   b) $\lim_{x\to\infty}\left(\sqrt{x^2+1}-x\right)$
   c) $\lim_{n\to\infty}\sum_{i=1}^{n}\frac{3}{n}\left[\left(\frac{i}{n}\right)^2+1\right]$

2) Find　　20%
   a) $\int (x+1)^2 Cos(x^3+3x^2+3x)dx$
   b) $\int_{-1}^{8} x^{-2/3}dx$
   c) f, if $f''(x)=12x^2+6x-4$, $f(0)=4$, and $f(1)=1$
   d) y', if $y=x^{\sqrt{x}}$

3) Evaluate $\int_0^1 \frac{dx}{\sqrt{1+x^2}}$ and show that $Sinh^{-1}x=ln(x+\sqrt{x^2+1})$　10%

4) The half-life of radium-226 is 1590 years. A sample of radium-226 has a mass of 100 mg. Find (a) formula for the mass that remains after t years. (b) the mass after 1000 years correct to the nearest milligram. © when will the mass be reduced to 30 mg.　15%

5) Find the extreme values of the function $f(x,y)=x^2+y$ on the circle $x^2+y^2=1$.　10%

6) Solve　　10%
   a) $y''-4y=xe^x+Cos2x$
   b) $y''+y=tanx$, $0<x<\pi/2$

7) The density at any point on a semicircular lamina is proportional to the distance from the center of the circle. Find the center of mass of the lamina.　　10%

8) Evaluate $\oint_c y^2dx+3xydy$, where c is the boundary of the semiannular region D in the upper half-plane between $x^2+y^2=4$ and $x^2+y^2=1$.　10%