國立屏東教育大學103學年度研究所碩士班入學考試

微積分(A) 試題

（應用物理系光電暨材料碩士班）

※請注意：答案須寫在答案卷上，否則不予計分。

計算題（每題10分，共100分）

1. $e^{y}dx + x^{2}dy = 0$. Find general solution of y(x). (10%)

2. (a) $f(x) = x^{10}\sin(2x), \frac{df(x)}{dx} = ?$ (5%)

   (b) $f(x) = 2^{x} + \ln(x^{2}+1), \frac{df(x)}{dx} = ?$ (5%)

3. (a) $\lim_{x\to 0}\frac{\sin(3x)}{x} = ?$ (5%)

   (b) $\lim_{x\to\infty}\frac{2^{5x}}{x} = ?$ (5%)

4. $\int_{0}^{\infty} e^{-2t}tdt = ?$ (10%)

5. $r = \sqrt{x^{2}+y^{2}+z^{2}}$， $\nabla\sin(r) = ?$. (10%)

6. 解微分方程式： $x^{2}y'' + xy' + 9y = 0$. (10%)

7. 若 $A = \begin{bmatrix} 1 & 3 \\ 0 & 1 \end{bmatrix}$，則 $A^{n} = ?$. (10%)

8. Find $\int \frac{1}{\sqrt{9-x^{2}}}dx$. (10%)

9. 若 $x^{4}+2y = t, x^{2}+y^{2} = t^{2}$，且 $u = xy$，請問 $\frac{du}{dt} = ?$ (10%)

10. Find the volume of the solid that is bounded by cylinder $y = x^{2}$ and by the plane $y + z = 4$ and $z = 0$.（10%）