國立臺北大學109學年度日間學士班暨進修學士班轉學生招生考試試題

學制系級：通訊工程學系、資訊工程學系日間學士班2年級

科　　目：微積分

☐可 ☑不可使用計算機

注意事項：(1)請按題號順序作答，並註明題號。(2)可用鉛筆。(3)不可使用計算機。
(4)計算題需要計算過程。

1. (15%) Use the Lagrange multipliers to find the extreme values of $f(x,y) = x^2 + 2y^2$ on the circle $x^2 + y^2 = 1$

2. (10%) Find y' if $x^y = y^x$.

3. (25%) Sketch the curve $y = e^{-1/(x+1)}$

   (You need to describe (a) domain, (b) intercepts, (c) asymptotes (horizontal and vertical if any), (d) intervals of increase and decrease, (e) local maximum and minimum values, (f) interval of concavity, (g) point of inflection, and (h) sketch the curve)

4. (10%) Evaluate the integrals: (a)$\int_0^1 \frac{\sqrt{x}}{x+1}\,dx$. (b) $\int_0^\infty \frac{\ln x}{x^2}\,dx$.

5. (20%) Find the volume of the solid generated by revolving the region bounded by $y = \sqrt{x}$ and the lines $y = 2$ and $x = 0$ about (a) the line $y = 2$, (b) the line $x = 4$.

6. (20%) Find the first four nonzero terms in the Maclaurin series for (a)$\frac{1}{\sqrt{1-t^2}}$, and

   (b) $\sin^{-1}x = \int_0^x \frac{1}{\sqrt{1-t^2}}dt$.

試題隨卷繳交