

國立屏東教育大學 103 學年度學士班轉學考試

微積分 試題

(應用數學系/應用物理系/資訊科學系)

*注意事項：

- (1) 本試題共 1 頁，答案請「橫式」書寫，並依規定上下翻頁。
(2) 不必抄題，但請依序將題號標出，並寫在答案紙上，否則不予計分。

一、計算題(每題 10 分，共 100 分)

1. Find $\frac{dy}{dx}$ given that $x^2y^3 - \cos x + \ln y = 0$.

2. Find the derivative of the function $F(x) = \int_0^{x^2+3} \sin s ds$.

3. Find the area of the region bounded by the graphs of $y = x^2$ and $x + y = 2$.

4. Find the derivatives of the functions (a) $f(x) = \ln\left(\frac{4x-3}{2x-1}\right)$, (b) $g(x) = \sin(e^{x^2+2014})$.

5. Find $\int_0^{\infty} e^{-x} dx$.

6. Find the integral $\int x \sin 3x dx$.

7. Evaluate the iterated integral:

$$\int_0^1 \int_0^{\sqrt{1-x^2}} x dy dx.$$

8. Find $\partial w/\partial s$ and $\partial w/\partial t$ by using the appropriate chain rule, where

$$w = xyz, \quad x = s + t, \quad y = s - t, \quad z = st^2.$$

9. Evaluate the limit: $\lim_{x \rightarrow 1^+} \frac{\int_1^x \cos \theta d\theta}{x-1}$.

10. Determine whether the improper integral $\int_0^{\infty} (x-1)e^{-x} dx$ diverges or converges. Evaluate the integral if it converges.