

國立屏東大學 105 學年度研究所碩士班入學考試

微積分 試題

(應用數學系碩士班)

※請注意：1.本試題共一頁。

2.答案題號須標示清楚，並寫在答案卷上，否則不予計分。

計算題 (每題 10 分，共 100 分)

1. Find the area of the region bounded by the graphs of $y = x^2 - 4x + 3$ and $y = -x^2 + 2x + 3$.
2. Find dy/dx given that $x \ln y + y \ln x = 3$.
3. Compute the integral $\int \frac{dx}{x(x-4)}$.
4. Find the sum of the series $\sum_{n=1}^{\infty} \left[\frac{1}{2^n} - \frac{1}{n(n+1)} \right]$.
5. Evaluate the integral $\int_0^2 \int_0^{\sqrt{z}} \int_0^x (x+2z) dy dx dz$.
6. Find the values of a and b such that $\lim_{x \rightarrow 0} \frac{a - \cos bx}{x^2} = 2$.
7. Find the tangent line to the graph $x^2 + 4y^2 = 4$ at the point $(\sqrt{2}, -1/\sqrt{2})$.
8. Find the arc length of the graph of $y = \ln(\cos x)$ from $x=0$ to $x=\pi/4$.
9. Find $\partial z/\partial x$ and $\partial z/\partial y$ for $3x^2z - x^2y^2 + 2z^3 + 3yz - 5 = 0$.
10. Sketch the region of integration and then evaluate the iterated integral $\int_0^2 \int_{y^2}^4 \sqrt{x} \sin x dx dy$.