

東吳大學 103 學年度轉學生(含進修學士班轉學生)招生考試試題

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系級	數學系三年級	考試時間	100 分鐘
科目	高等微積分	本科總分	100 分

1. (17 points) Find the tangent plane to the surface in  $\mathbb{R}^3$  described by the equation

$$z = \sqrt{x} + \tan^{-1} y$$

at the point  $(9, 0, 3)$ .

2. (17 points) Find all the critical points of the function

$$f(x, y) = x^2 + 3y^4 + 4y^3 - 12y^2$$

and tell whether each critical point is a local maximum, local minimum, or saddle point.

3. (17 points) Determine the values of  $x$  at which the series

$$\sum_{n=0}^{\infty} \frac{(-1)^n (x+1)^{2n}}{3n+2}$$

converges absolutely or conditionally.

4. (34 points) Evaluate the following integrals.

a.  $\int_0^{\infty} e^{-x^2} dx$

b.  $\int_0^1 \int_{\sqrt{x}}^1 \cos(y^3 + 1) dy dx$ .

5. (15 points) Show that if a sequence  $\{x_k\}$  in  $\mathbb{R}$  is convergent then it is a Cauchy sequence.