

大同大學 96 學年度研究所碩士班入學考試試題

考試科目：微積分

所別：事業經營研究所

第1-1頁

註：本次考試 不可以參考自己的書籍及筆記； 不可以使用字典； 不可以使用計算器。

1. Find the sum of the series $1^3 + 2^3 + 3^3 + \dots + n^3$. (10%)

2. Use a power series to approximate the following definite integral with an error of less than 0.01.

$$\int \exp(-x^2) dx, \quad 0 \leq x \leq 1. \quad (10\%)$$

3. Find the distance between the point $q = (3, -1, 4)$ and the line given by $x = -2 + 3t$, $y = -t$, and $z = 1 + 4t$. (10%)

4. What is the range of $f(x, y) = (16 - 4x^2 - y^2)^{1/2}$? Describe the graph of $f(x, y)$. (10%)

5. Find the area of the region R that lies below the parabola $y = 4x - x^2$, above the x-axis, and above the line $y = -3x + 6$. (10%)

6. How do you define the conics in terms of the general second-degree equation? What is the determinant to determine whether the graph of the equation is a parabola, an ellipse, or a hyperbola? (15%)

7. Estimate the parameters a and b of the straight line $f(x) = a + bx$ through the four points as showed below such that the sum of the squares of the differences of y and $f(x)$, i.e., $\sum (y - f(x))^2$, for the four points is minimized. (15%)

x	1	2	2	5
y	2	6	8	10

8. Find the solution of the differential equation (10%)

$$y'' - 4y' + 4y = x^2 - 3.$$

9. Find the relative extrema for $f(x) = 5x^3 - 3x^5$. (10%)