

大同大學 98 學年度轉學入學考試試題

考試科目：微積分

所別：各系所

第 全 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。

(15%) 1. Find the derivatives of the functions

$$(1) f(x) = \sqrt[3]{x^2 - 1} \quad (2) g(x) = \frac{x}{2} - \frac{\sin 2x}{4}$$

$$(3) H(\theta) = \frac{1}{2} e^{\sin 2\theta}.$$

(14%) 2. Find the indefinite integrals of the following functions

$$(1) \int x \sin x^2 dx \quad (2) \int x(x^2 + 1)^2 dx.$$

(14%) 3. Apply L'Hopital's rule to find the following limits

$$(1) \lim_{x \rightarrow -\infty} \frac{x^2}{e^{-x}} \quad (2) \lim_{x \rightarrow \infty} e^{-x} \sqrt{x}.$$

(9%) 4. Which points on the graph of $y = 4 - x^2$ are closet to point $(0, 2)$?

(12%) 5. Find the interval of convergence and the radius of convergence of $\sum_{n=1}^{\infty} \frac{x^n}{n^2}$.

(14%) 6. Find the partial derivatives of the functions

$$(1) f(x, y, z) = xy + yz^2 + xz \quad (2) g(x, y, z) = z \sin(xy^2 + 2z).$$

(14%) 7. Evaluate the following iterated integrals

$$(1) \int_0^1 \int_0^2 (x + y) dy dx \quad (2) \int_0^{\pi/2} \int_0^{2 \cos \theta} r dr d\theta.$$

(8%) 8. Find the volume of the solid region bounded by the paraboloid $z = 4 - x^2 - 2y^2$ and the xy -plane.