

# 大同大學 97 學年度轉學入學考試試題

考試科目：微積分

所別：各系

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。

- (13%) Find the volume (體積) of the largest rectangular (矩形) box in the first octant (第一卦限) with three faces (面) in the coordinate planes (座標平面) and one vertex (頂點) in the plane  $3x + y + 2z = 12$ .
- (13%) Find the area of the region above the line  $r = \csc \theta$  and inside the circle  $r = 2$ .
- (13%) Evaluate the integral  $\int \frac{x^3 + 5x^2 - 4x + 4}{(x^2 - 2x + 1)(x^2 + x + 1)} dx$ .
- (13%) Find the volume of the solid (固體) that lies under the paraboloid (拋物面)  $z = x^2 + y^2$ , above the  $xy$ -plane, and inside the cylinder (圓柱面)  $x^2 + y^2 = 2x$ .
- (12%) Evaluate the integral  $\int \sin(\ln x) dx$ .
- (12%) Let  $y = \frac{(x^2 + 3)^{2/3} (3x + 2)^2}{\sqrt[3]{x^2 + 1}}$ . Use the logarithmic differentiation (對數微分法) to find  $\frac{dy}{dx}$ .
- (12%) The region in the first quadrant (第一象限) bounded by  $x = 0$ ,  $y = \sin(x^2)$ , and  $y = \cos(x^2)$  is revolved about the  $y$ -axis. Find the volume of the resulting solid.
- (12%) Find the interval of convergence (收斂區間) for  $\sum_{n=2}^{\infty} \frac{(3x-1)^n \ln n}{n \cdot 5^n}$ .