

# 國立中央大學八十六學年度碩士班研究生入學試題卷

所別: 工業管理研究所 乙組 科目: 微積分 共 1 頁 第 1 頁

1. (50%) Find the following:

a)  $\lim_{x \rightarrow 0} x \ln|x|$

b)  $\lim_{x \rightarrow \infty} x^{1/x}$

c)  $\int_0^{\pi/2} x \sin x dx$

d)  $\int_0^1 \sqrt{1+x^2} dx$

e)  $\frac{d}{dx} \int_0^{2x} \cos(t^2) dt$

2. (15%) Find and classify all the critical points of

$$f(x, y) = x^3 + y^3 - 3x - 3y.$$

3. (15%) Let  $D = \{(x, y), x > 0, y > x^2, y < 2 - x^2\}$ , find

$$\iint_D \sqrt{xy} dx dy.$$

4. (20%) Find the volume of the solid by rotating the area bounded by curves  $x = y^2$  and  $x = 2y$  about the y-axis.