

招生學年度	九十九	招生類別	碩士班
系所班別	運籌管理研究所碩士班		
科目	微積分		
注意事項	本考科可使用掌上型計算機		

1. Compute  $\frac{df(x)}{dx}$  when

(1)  $f(x) = x \sin x + \cos x$  (10 points)

(2)  $f(x) = \int_0^{x+\sin x} 2t^2 dt$  (10 points)

2. Compute

(1)  $\int \sqrt{x}(3+x^3) dx$  (10 points)

(2)  $\int \frac{x}{x^2+1} dx$  (10 points)

3. Find the second-order Taylor expansion for  $e^x \cos y$  about  $x=0$  and  $y=\pi$ , then use it to approximate the value of  $e^{-0.1} \cos(\pi+0.2)$ . (10 points)

4. (1) Find the area of the region bounded by  $y = x^3$  and  $y = 3x + 2$ . (10 points)

(2) Find the volume of the solid obtained by rotating around the x-axis the region bounded by  $x = \ln y$ ,  $x = 0$ ,  $x = 3$  and  $y = 0$ . (10 points)

5. Use the Method of Lagrange Multipliers to find the maximum and minimum of  $y$  on the surface  $2x^2 + y^2 + 3z^2 + 4xy - 12xz = 35$ . (15 points)

6. Solve  $y'' - 3y' + 2y = 0$  with  $y(0) = 0$  and  $y'(0) = 1$ , where  $y''$  represents

$\frac{d^2 y(x)}{dx^2}$  and  $y'$  represents  $\frac{dy(x)}{dx}$ . (15 points)