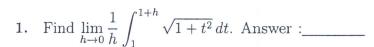
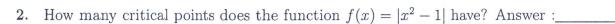
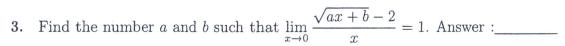
## \*請在答案卷內作答

甲、填充題: 共 8 題, 每題 8 分, 共 64 分。請在答案卷上列出題號依序作答。

請注意:本(甲、)部分,共8題,命題型態為填充題,不必詳列計算過程,倘若答案被包含在演算過程,將被視為試算流程,無法計分。







- 4. Market has two commodities A and B. The demand equations that relate the quantities demanded x and y to the unit prices p and q of the commodities A and B respectively are given by  $x = f(p,q) = \frac{q}{p+q}$ ,  $y = g(p,q) = e^{-(2q+p^2)}$ . Are A and B substitute, complementary or neither? Answer:
- 5. Find the slope of the tangent line to the graph of the function  $f(x) = (\tan x)^2 + e^x$  at (0,1). Answer:\_\_\_\_\_
- 6. Find the volume of solid bounded above by  $z = f(x, y) = e^{-x^2}$  and below by the plane region R which is bounded by y = x, x = 1 and y = 0. Answer:
- 7. The Cobb-Douglas production function for a software manufacturer is given by  $f(x,y) = 100x^{3/4}y^{1/4}$  where x represents the units of labor (at \$150 per unit) and y represents the units of capital (at \$250 per unit). The total cost of labor and capital is limited to \$50,000. Find x and y that will yield the maximum production level for this manufacturer.

8. Suppose f'' is continuous on [0,1], f(1)=2, f'(1)=2 and the average value of f on [0,1] is 2. Evaluate  $\int_0^1 x^2 f''(x) dx$ . Answer:\_\_\_\_\_

乙、計算、證明題:共3題,每題12分,共36分。須詳細寫出計算及證明過程,否則不予計分。

- 1 Find any extrema of the function  $f(x,y) = e^{-xy/4}$  subject to the constraint  $x^2 + y^2 \le 1$ .
- **2.** Evaluate  $\int_{0}^{6} \int_{x/3}^{2} x \sqrt{y^3 + 1} \, dy \, dx$

Answer :\_\_\_

3. Determine whether the series  $\sum_{n=1}^{\infty} \frac{n!}{n^n}$  converges absolutely or conditionally, or diverges.