

1、若 $z = f(x, y)$, $x = x(t)$, $y = y(t, s)$, 求下列各式。

$$\frac{\partial z}{\partial t}, \frac{\partial z}{\partial s}, dz \text{ 之 } 15\%$$

2、求下列各問題之值。20%

$$1) \lim_{x \rightarrow 0} \frac{e^x - 1}{2x - 1}; 2) \lim_{x \rightarrow 0} \frac{\sqrt{x+2} - \sqrt{2}}{\sqrt{x+1} - 1}; 3) \lim_{x \rightarrow 10^+} \frac{1}{x-10}; 4) f(x) = \frac{2x^3 + 4}{x^2 - 4x + 1}, f'(x) = ?$$

3、一投資組合之報酬為 $R_p = \sum_{i=1}^n x_i R_i + \left[1 - \sum_{i=1}^n x_i\right] r$, 其報酬之標準差為

$$\sigma_p = \sqrt{\sum_{i=1}^n x_i^2 \sigma_i^2 + 2 \sum_{i=1}^n \sum_{j=1}^n x_i x_j \text{cov}(x_i, x_j)}$$

在特定報酬下，最小標準差之報酬以 Lagrangian 式

子來表達為： $L = \sigma_p + \lambda \left[R_p - \sum_{i=1}^n x_i R_i - \left(1 - \sum_{i=1}^n x_i\right) r \right]$ 。求偏導數 $\frac{\partial L}{\partial x_i}$ ，(假設 $\text{cov}(x_i, x_j)$ 為一常數)。

10%

4、The annual earnings of **FIN CORP.** t years after 1/1/1995, is R millions of dollars, and

$$R = 2t^2/5 + 2t + 10.$$

Find 1) the rate at which the earnings were growing on 1/1/1997; 2) the rate at which the earnings should be growing on 1/1/2001. 10%.

5、 $f(x) = \frac{x^2 + 4}{x}$. Find 1) the relative extrema; 2) the points of reflection; 3) the intervals on

which f is decreasing; 4) draw a sketch of the graph for $f(x)$. 20%

6、The demand equation for product A is $x = 20 - 2p^2$. x is the units demanded at unit price

p . Find 1) the decrease in demand when the unit price is increased from \$2 to \$2.05; 2) the price elasticity of demand at $p = 2$. 10%.

7、Find $\int x^3 e^x dx$. 10%.

8、Find $\int \frac{dx}{6 - 2x^2}$. 5%.