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

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

2、求下列各問題之值。20%

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

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

$\sigma_p=\sqrt{\sum_{i=1}^{n}x_i^2\sigma_i^2+2\sum_{i=1}^{n}\sum_{\substack{j=1\\ i\neq j}}^{n}x_ix_j\operatorname{cov}(x_i,x_j)}$，在特定報酬下，最小標準差之報酬以 Lagrangian 式子來表達為：$L=\sigma_p+\lambda\left[R_p-\sum_{i=1}^{n}xR_i-\left(1-\sum_{i=1}^{n}x_i\right)r\right]$。求偏導數 $\frac{\partial L}{\partial x_i}$，(假設 $\operatorname{cov}(x_i, x_j)$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 $\int x^3e^x dx$. 10%.

8、Find $\int\frac{dx}{6-2x^2}$. 5%.