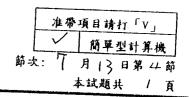# 淡江大學九十四學年度轉學生招生考試試題

系別： 商管組三年級　　　　科目：微　積　分

（請詳列計算過程，否則酌予扣分）

1. Find the following limits and derivatives. (6% each)

   (i) $\lim\limits_{x \to 2} \dfrac{2-x}{x^2-4}$

   (ii) $\lim\limits_{\Delta x \to 0} \dfrac{1-(x+\Delta x)^2 - (1-x^2)}{\Delta x}$

   (iii) $\dfrac{d}{dx}\left(\dfrac{\sqrt{3x-1}}{(1-3x)^2}\right)$

   (iv) $\dfrac{d}{dx}\left(e^{-x}\ln\left(x\sqrt{x^2+4}\right)\right)$

2. Find the following integrals. (6% each)

   (i) $\displaystyle\int \dfrac{x^2+1}{\sqrt{x^3+3x+4}}\,dx$

   (ii) $\displaystyle\int e^x\sqrt{1-e^x}\,dx$

   (iii) $\displaystyle\int_1^e x^5\ln x\,dx$

   (iv) $\displaystyle\int \dfrac{xe^{2x}}{(2x+1)^2}\,dx$

   (v) $\displaystyle\int_{1/2}^{\infty} \dfrac{1}{\sqrt{2x-1}}\,dx$

   (vi) $\displaystyle\int_0^1 \int_0^{\sqrt{1-y^2}} (x+y)\,dx\,dy$

3. A company manufactures a product at two locations. The costs of manufacturing x_1 units at plant 1 and x_2 units at plant 2 are

$$C_1 = 0.03x_1^2 + 4x_1 + 300$$

$$C_2 = 0.05x_2^2 + 7x_2 + 175$$

respectively. If the product sells for \$10 per unit, find x_1 and x_2, such that the profit, $P = 10(x_1+x_2) - C_1 - C_2$, is maximized. (15%)

4. The rate of change in sales for Wal-Mart from 1991 through 2000 can be modeled by

$$\dfrac{ds}{dt} = 2.38t + \dfrac{10.8}{t}$$

where s is the sales (in millions) and $t=1$ corresponds to 1991. In 1992, the sales for Wal-Mart were \$55484 million.
   (a) Find a model for sales from 1991 through 2000. (8%)
   (b) Find Wal-Mart's sales in 1998. (7%)

5. Find the area bounded by $f(x) = x^2 + 2x + 1$ and $g(x) = 2x + 5$. (10%)