

淡江大學 105 學年度進修學士班寒假轉學生招生考試試題

系別：商管組 (統計系) 二年級

科目：微積分

6-1

考試日期：12月3日(星期六) 第1節

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1.(10%)求下列極限

(i) $\lim_{x \rightarrow -1} \frac{x^2 - x - 2}{2x^2 - x - 3}$ (ii) $\lim_{x \rightarrow 2} \frac{|x-2|}{x-2}$

2.(30%)試求導函數 dy/dx 。

(a) $y = e^{x^2 - \sqrt{x}}$ (b) $y = [\ln(9 - x^3)]^4$ (c) $\frac{d}{dx} (2x^2 - \frac{2}{\sqrt{x}})(\sqrt{x^2 - 2})$

(d) $x \ln y + y \ln x = 4$ (d) $x^2 y^3 + 6x^2 = y + 12$

3.(30%) 試求下列各積分。

(a) $\int_1^2 \frac{(\ln x)^2}{x} dx$ (b) $\int x^3 \sqrt{9 + 4x^2} dx$ (c) $\int_0^1 \int_1^3 (2x + 4y) dx dy$.

(d) $\int_{-2}^2 \int_0^{\sqrt{4-x^2}} 2xy dy dx$ (f) $\int_0^1 \int_{x^2}^1 x e^{y^2} dy dx$

4. (10%) At a distance of 4000 feet from the launch site, a spectator is observing a rocket being launched. If the rocket lifts off vertically and is rising at a speed of 600 feet/second when it is at an altitude of 3000 feet. How fast is the distance between the rocket and the spectator changing at that instant?

5. (10%) The productivity of a certain company is given by the Cobb-Douglas model as

$$P(x, y) = 100x^{1/4}y^{3/4}$$

where x units of labor and y units of capital are utilized. Each unit of labor costs \$200 and each unit of capital costs \$150. If the company has a total of \$1,600 for labor and capital, how much of each should it use to maximize production.

6. (10%) Let $f(x, y) = x^3 - y^2 - 12x + 6y + 5$. Find all possible relative maximum and minimum points of $f(x, y)$.