

國立屏東科技大學 106 學年度 碩士班暨碩士在職專班 招生考試
企業管理系碩士班 微積分試題

1. Find all possible real solutions of each equation. (4% × 4)

a. $x^4 - 4x^3 + 3x^2 = 0$

b. $x^3 + 4x^2 + 4x + 3 = 0$

c. $\frac{2x+1}{x} + \frac{3}{x-2} = 0$

d. $(x^2 - 1)\sqrt{x-1} - \sqrt{(x-1)^3} = 0$

2. Determine whether the following limits exist. If so, compute the limit. (4% × 3)

a. $\lim_{x \rightarrow 1} \frac{x^2 - 2x + 1}{x - 1}$

b. $\lim_{x \rightarrow 8} (2x - \sqrt[3]{x})$

c. $\lim_{x \rightarrow +\infty} xe^{-x}$

3. Find the derivative of the given function. (4% × 5)

a. $y = x\sqrt{x}$

b. $y = \frac{x^2}{x^2 - 1}$

c. $y = x^2 e^{x^2+1}$

d. $y = \frac{\ln(x^2 + 1)}{x^2 + 1}$

e. $y = (2x^3 - x + 5)(x^2 + x + 1)^3$

4. Calculate the following integrals. (4% × 5)

a. $\int 2^3 dx$

b. $\int (\frac{3}{x} - \frac{x}{3}) dx$

c. $\int \frac{5}{\sqrt{x-5}} dx$

d. $\int_0^{\ln 2} \frac{e^x + e^{-x}}{2} dx$

e. $\int_0^4 (x-1)(x-2) dx$

5. Suppose that the price p (in dollars) and the weekly sales q units of a certain commodity satisfy the demand equation $q = \frac{(450 - p)^2}{100}$ ($0 \leq p \leq 450$). (6% × 2)

a. Find the price elasticity of demand when the price is set at \$100 per unit.

b. Find the price at which the company should sell the commodity in order to maximize weekly revenue.

6. A pizza box is formed from a 25-cm by 40-cm rectangular piece of cardboard by cutting out six squares of equal size, three from each long side of the rectangle (the ends and the middle), and then folding the cardboard in the obvious manner to create a box. Let x be the length of each side of the six squares. For what value of x will the box have greatest volume? (8%)

7. Suppose that money is deposited daily in a savings account at an annual rate of \$1000. If the account pays 4% interest compounded continuously, (a) estimate the balance in the account at the end of 5 years? (b) how much time is required until the value of the investment reaches \$ 10000? (6% × 2)