

國立屏東科技大學 107 學年度 碩士班暨碩士在職專班 招生考試
企業管理系 微積分試題

1. Find the equation of the line that passes through the point $(-1, 1)$ and is parallel to the line $2x-y+1=0$. (6%)

2. In the following problems, find the indicated limits, if they exist. (12%)

(1) $\lim_{x \rightarrow 3} \frac{x-3}{x+2}$ (2) $\lim_{x \rightarrow \infty} \frac{x^2+2x-3}{x^2+5x+6}$ (3) $\lim_{x \rightarrow 3^+} \frac{|x-3|}{x-3}$ (4) $\lim_{x \rightarrow 1^-} \frac{\sqrt{x}-1}{x-1}$

3. Find the derivative of the function. (20%)

(1) $f(x) = 2\sqrt{x} + 4x^2 + 1$ (2) $f(x) = \frac{x^2+1}{2x-1}$ (3) $f(x) = \ln(e^{x^2} + 1)$

(4) $f(x) = (3x^2)(x^2 - 2x)^4$

4. Find the integral of the function. (20%)

(1) $\int (x^3 + 2x - \frac{1}{x^2}) dx$ (2) $\int x\sqrt{x-2} dx$ (3) $\int \frac{x+1}{x^2+2x-5} dx$ (4) $\int \frac{e^{-x}-1}{(e^{-x}+x)^2} dx$

5. For $f(x) = x\sqrt{9-x}$, find any points of inflection, intervals of concavity upwards and downwards and relative extrema. (15%)

6. Find the dimensions of the largest rectangle that can be inscribed in a semicircle of radius r . (8%)

7. The management of National Electric has determined that the daily marginal cost function associated with producing their automatic drip coffeemakers is given by $C'(x) = 0.00003x^2 - 0.03x + 20$ where $C'(x)$ is measured in dollars per unit and x denotes the number of units produced. Management has also determined that the daily fixed cost incurred in producing these coffeemakers is \$500. Management has also determined that the daily marginal revenue function associated with producing and selling their coffeemakers is given by $R'(x) = -0.03x + 60$ where x denotes the number of units produced and sold and $R'(x)$ is measured in dollars per unit. (15%)

- (1) Determine the total cost function $C(x)$ associated with producing these coffeemakers per day.
- (2) Determine the revenue function $R(x)$ associated with producing and selling these coffeemakers.
- (3) What is the demand equation relating the unit price to the quantity of coffeemakers demanded?