

1. 設 $f(x)=x^2+x$ ，求其過點 $(1, f(1))$ 之切線的方程式。(10%)
2. 一生產溜冰鞋之工廠在每天生產100雙溜冰鞋時，其固定成本為300元/天，總成本為4,300元/天，假設總成本 $C(x)$ 與產量 x 具線性關係，則 (30%)
 - (a) 求此工廠之總成本函數 $C(x)$ 、邊際成本函數及平均成本函數；
 - (b) 求平均成本函數之水平及垂直漸近線；
 - (c) 試證若此工廠繼續不斷地製造溜冰鞋，則其平均成本必將趨於穩定。
3. 令需求函數 $p = D(x) = 15 - \frac{1}{2}x$ ，供給函數 $p = S(x) = \frac{3}{2}x + 1$ ，其中 p 為價格、 x 為數量。請以積分法計算消費者剩餘及生產者剩餘(以元計)。(15%)
4. 求 $z = xe^y$ 圖形在 $R = \{(x, y) \mid -2 \leq x \leq 3, 0 \leq y \leq 2\}$ 方形區域上所形成立體之體積。(10%)
5. The Cobb-Douglas production function for a product is

$$N(x, y) = 100x^{0.25}y^{0.75}$$
 Where x is the number of units of labor and y is the number of units of capital required to produce N units of the product.(35%)
 - (a) Find the marginal productivity of labor and the marginal productivity of capital at $x=40$ and $y=50$. For the greatest increase in productivity, should management encourage increased use of labor or increased use of capital?(10%)
 - (b) Use differentials to estimate the change in production if the number of units of labor is increased from 40 to 41 and the number of units of capital is increased from 50 to 52.(10%)
 - (c) If each unit of labor costs \$48, each unit of capital costs \$36, and the company wants to make 54,000 units of this product, use the method of Lagrange multipliers to determine the allocations of labor and capital that will minimize its cost and find the minimum cost. (15%)