Contoh Latihan Soal UAS

Math Business

1. Perform the indicated operations matrix.

$$\begin{bmatrix} 2 & -4 \\ 3 & 2 \end{bmatrix} \times \begin{bmatrix} 4 & 0 \\ -1 & 3 \end{bmatrix} =$$

2. A pet store has 6 kittens, 10 puppies, and 7 parrots in stock. If the value of each kitten is $55, each puppy is $150, and each parrot is $35, find the total value of the pet store's inventory using matrix multiplication.

3. Solve the following systems with matrix algebra.

    $3X + Y = 170$

    $2X + 3Y = 160$

4. In problems a and b, differentiate the functions.

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

    b. $y = -13x^3 + 14x^2 - 2x + 7$

5. In problems a and b, cost functions are given, where c is the cost of producing and q units of a product. In each case, find the marginal cost function. What is the marginal cost at the given values of q?

    a. $c = 500 + 10q^2$; $q = 100$

    b. $c = 0.2q^2 + 4q + 50$; $q = 10$

6. Total Cost $\underline{C}$? => $\overline{C} = TC/Q$ => $TC = Q\overline{C}$

    $TC = Q\left(10Q^2 + 2Q + 10 + \frac{20}{Q}\right) = 10Q^3 + 2Q^2 + 10Q + 20$

    a. Pada saat Q = 50

    b. Marginal Cost adalah turunan dari Total Cost => $\frac{dc}{dq}$

7. Suppose production table from a leading mobile phone company "Duren Inc.", by using the table below, determine the number of mobile phone (amount of X) and the number of Tablet PC (amount of Y) are produced. Please solve the problem by using Inverse Matrix.

Production Table Duren Inc. :

Department	Hours of work to produce mobile phone	Hours of work to produce Tablet PC	The total hours in use
Manufacturing	4	3	300
Finishing and Packaging	2	2	200

1. $\begin{bmatrix} 2 & -4 \\ 3 & 2 \end{bmatrix} \times \begin{bmatrix} 4 & 0 \\ -1 & 3 \end{bmatrix} = ?$

$= \begin{bmatrix} 8+4 & 0-12 \\ 12-2 & 0+6 \end{bmatrix} = \begin{bmatrix} 12 & -12 \\ 10 & 6 \end{bmatrix}$

2. Known :
   - kittens = 6, Price of each one = $55   Kittens = x
   - Puppies = 10, Price of each one = $150   Puppies = y
   - Parrots = 7, Price of each one = $35   Parrots = z

   <u>Ask</u> = Find the total value of the pet store's inventory using Matrix Multiplication.

   <u>Answer</u> =

   $F(x) = \$55$ If $x = 6 \longrightarrow$ $6 \cdot \$55 = \$330$
   $F(y) = \$150$ If $y = 10 \longrightarrow$ $10 \cdot \$150 = \$1.500$
   $F(z) = \$35$ If $z = 7 \longrightarrow$ $7 \cdot \$35 = \$245$ +
   $\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad = \$2.075$

   Total value of the pet store's inventory is $2.075

3. known = equation : $3x + y = 170$
   $\qquad\qquad\qquad\qquad\qquad 2x + 3y = 160$

   <u>Ask</u> = x = ? (x : y)
   $\qquad\quad y = ?$

   <u>Answer</u>
   $3x + y = 170$ | ×3 | $9x + 3y = 510$
   $2x + 3y = 160$ | ×1 | $2x + 3y = 160$ −
   $\qquad\qquad\qquad\qquad\qquad 7x \qquad = 350$
   $\qquad\qquad\qquad\qquad\qquad x \qquad = 50$

   $3x + y = 170$ | $x = 50$ | (x : y)
   $3(50) + y = 170$ | $y = 20$ | (50 : 20)
   $150 + y = 170$
   $\qquad\quad y = 20$

4. Known : Functions : a. $y = 4x^2 - 2x + 3$
                         b. $y = -13x^3 + 14x^2 - 2x + 7$
   Ask : Differentiate the function !

Answer =

a. $y = 4x^2 - 2x + 3$
   $y' = 8x - 2 //$

b. $y = -13x^3 + 14x^2 - 2x + 7$
   $y' = -39x^2 + 28x - 2$

5. Known : a. $C = 500 + 10q^2$; $q = 100$
            b. $C = 0.2q^2 + 4q + 50$; $q = 10$
   Ask : what is the Marginal cost at the given values of q ?

Answer :

a. $C = 500 + 10q^2$; $q = 100$
   $C = P(500 + 10q^2)$
   $C = 500P + 10q^3 P$
   $C = 500 + 30q^2$
   $\quad = 500 + 30(10.000)$
   $\quad = 500 + 300.000$
   $\quad = 300.500$

b. $C = 0.2q^2 + 4q + 50$; $q = 10$
   $C = P(0.2 q^2 + 4q + 50)$
   $C = 0.2q^3P + 4q^2P + 50P$
   $C = 0.6q^2 + 8q + 50$
   $C = 0.6(10)^2 + 8(10) + 50$
   $\quad = 60 + 80 + 50$
   $\quad = 190$

6. a. Pada saat $Q = 50$ => $10(50)^3 + 2(50)^2 + 10(50) + 20$
      = Rp 1.255.520,-

   b. Marginal Cost adalah turunan dari Total Cost => $\frac{dc}{dq}$
      $\frac{dc}{dq} = 30Q^2 + 4Q + 10$
      $\quad = 30(50)^2 + 4(50) + 10$
      $\quad = $ Rp 75.210,-

7.

$$A = \begin{bmatrix} 4 & 3 \\ 2 & 2 \end{bmatrix}, \quad X = \begin{bmatrix} X \\ Y \end{bmatrix}, \quad B = \begin{bmatrix} 300 \\ 200 \end{bmatrix}, \text{determinan } |A| = 8 - 6 = 2$$

$$A^{-1} = \begin{bmatrix} 2/2 & -3/2 \\ -2/2 & 4/2 \end{bmatrix} = \begin{bmatrix} 1 & -1{,}5 \\ -1 & 2 \end{bmatrix}$$

$$X = A^{-1} \cdot B$$

$$X = \begin{bmatrix} 1 & -1{,}5 \\ -1 & 2 \end{bmatrix} \begin{bmatrix} 300 \\ 200 \end{bmatrix} = \begin{bmatrix} 300 - 300 \\ -300 + 400 \end{bmatrix} = \begin{bmatrix} 0 \\ 100 \end{bmatrix}$$

Handphone yang di produksi = 0 unit
Tablet yang di produksi = 100 unit