

A manufacturer produces two models of toy airplanes. It takes the manufacturer 32 minutes to assemble model A and 8 minutes to package it. It takes the manufacturer 20 minutes to assemble model B and 10 minutes to package it. In a given week, the total available time for assembling is 3200 minutes, and the total available time for packaging is 960 minutes. Model A earns a profit of \$8 for each unit sold and model B earns a profit of \$11 for each unit sold. Assuming the manufacturer is able to sell as many units of each model as it makes, how many units of each model should be produced to maximize the profit for the given week?

Model A = x Model B = y

$$P = 8x + 11y$$

$$32x + 20y \leq 3200$$

$$8x + 10y \leq 960$$

$p = 8x + 11y$

$(80, 32) \quad p = 992$
 $(0, 0) \quad p = 0$
 $(0, 96) \quad p = 1056$
 $(100, 0) \quad p = 800$

$x \leq 100$
 $y \leq 96$
 Model A 0
 Model B 96

$4(80) + 11(32) = 992$

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6.2 - Matrices

Row → Column

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \quad R \times C$$

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix} = \begin{bmatrix} 6 & 8 \\ 10 & 12 \end{bmatrix}$$

2×2 2×2 2×2

$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \quad 2 \times 2$

$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix} \quad \begin{bmatrix} \quad \quad \quad \end{bmatrix}$

3×3 3×1

1×3
 Scalar multiplication
 $4 \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} = \begin{bmatrix} 4 & 8 \\ 12 & 16 \end{bmatrix}$

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$C = \begin{bmatrix} -5 & 0 \\ 0 & 4 \end{bmatrix} \quad D = \begin{bmatrix} -2 & 0 \\ 0 & 1 \end{bmatrix} \quad \begin{matrix} 2 \times 3 = 6 \\ 3 \times 2 = 6 \end{matrix}$

(A) DC (B) CD (C) D²

$\begin{bmatrix} -2 & 0 \\ 0 & 1 \end{bmatrix} \cdot \begin{bmatrix} -5 & 0 \\ 0 & 4 \end{bmatrix} = \begin{bmatrix} 10 & 0 \\ 0 & 4 \end{bmatrix}$

$\begin{bmatrix} -5 & 0 \\ 0 & 4 \end{bmatrix} \cdot \begin{bmatrix} -2 & 0 \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} 10 & 0 \\ 0 & 4 \end{bmatrix}$

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

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$K = \begin{matrix} & A & B & M \\ M & 430 & 460 & 450 \\ T & 630 & 610 & 640 \\ W & 540 & 490 & 530 \end{matrix}$

$A = \begin{bmatrix} 430 & 460 & 450 \\ 630 & 610 & 640 \\ 540 & 490 & 530 \end{bmatrix}$

$B = \begin{bmatrix} 1.3 & 1.2 & 1.7 \end{bmatrix}$

$BA = \begin{bmatrix} M & T & W \\ 1.3 & 1.2 & 1.7 \end{bmatrix} \begin{bmatrix} A & B & M \\ 430 & 460 & 450 \\ 630 & 610 & 640 \\ 540 & 490 & 530 \end{bmatrix}$

BA defined
 $1 \times 3 \quad 3 \times 3$

$BA = \begin{bmatrix} 2233 & 2127 & 2254 \end{bmatrix}$

(C) 2233

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