

260/- 4300

X_1 = present value of a stock
— invested amount.
200/- 5300 / gm

$X_1 \geq 0$

-1000

$X_1 \geq 0$

Unrestricted in sign.

Min $Z = 2X_1 - 3X_2 + 4X_3 \Rightarrow$ Max $W = -2X_1 + 3X_2 - 4X_3$
 $= -2X_1 - 3X_2' - 4(X_3' - X_3'')$

s.t.

$-X_1 + 3X_2 - X_3 \geq 3$
 $-X_1 - 3X_2' + X_3' + X_3'' \leq -3$

$2X_1 - 4X_2' - 7X_3' + 7X_3'' \geq 6$

$16X_1 - 2X_2' + 9X_3' - 9X_3'' \leq 14$

$16X_1 + 2X_2' + 9X_3' - 9X_3'' \leq 14$

$X_1 \geq 0, X_2 \leq 0, X_3$ is unrestricted in sign

$X_2' = -X_2$

$X_3 = X_3' - X_3''$

$X_2' \geq 0$

$X_3' \geq 0, X_3'' \geq 0$

$-X_1 - 3X_2' - X_3' + X_3'' - X_4 = 3$

$2X_1 - 4X_2' - 7X_3' + 7X_3'' - X_5 = 6$

$16X_1 + 2X_2' + 9X_3' - 9X_3'' + X_6 = 14$

$X_1, X_2', X_3', X_3'', X_4, X_5, X_6 \geq 0$



$x = \begin{bmatrix} b_1 \\ b_2 \\ \vdots \end{bmatrix}$

$$\underbrace{\begin{bmatrix} m \times m \\ A' \end{bmatrix}}_A \underbrace{x}_m = \begin{bmatrix} b_1 \\ b_2 \\ \vdots \\ b_m \end{bmatrix}$$

n
 C_m

$$A' \cdot x = b \Rightarrow x_1$$

$$A'' \cdot x = b \Rightarrow x_2$$

$$\boxed{\text{Max } Z = 11x_1 + 18x_2 + 23x_3}$$

800

C
56

$$\begin{bmatrix} 2x_1 + 3x_2 + x_3 \\ 3x_1 - x_2 + 2x_4 \\ x_1 + 7x_2 - 8x_3 \end{bmatrix}$$

$$= x_4$$

$$= x_5$$

$$+ x_6$$

$$= 7$$

$$= 9$$

$$= 8$$

$$x_1 \dots x_6 \geq 0$$

$$x_4 = x_5 = x_6 = 0$$

$$\checkmark (x_1, x_2, x_3)$$

$$\checkmark (x_1, x_2, x_4)$$

$$(x_1, x_2, x_5)$$

$$(x_1, x_2, x_6)$$

$$x_3 = x_5 = x_6 = 0$$

$$= \frac{6!}{3! \cdot 3!} \cdot \frac{6 \times 5 \times 4}{3 \times 2 \times 1} = 20$$

$$x_1 + x_2 - x_3 = 8$$

$$2x_1 - x_2 + 3x_3 = 11$$

$$A = \begin{bmatrix} 1 & 1 & -1 \\ 2 & -1 & 3 \end{bmatrix} \quad x = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}$$

$$b = \begin{bmatrix} 8 \\ 11 \end{bmatrix}$$

$$\text{rank}(A) = 2$$

put 3-2 variables as arbitrary
 & you can solve for the other two

$$Ax = b$$

$$\begin{aligned} x_1 + x_2 &= 8 + t \\ x_2 &= 11 - 3t \end{aligned}$$

if you can ...
the other two

$$\begin{aligned} x_1 + x_2 &= 8 + t \\ 2x_1 - x_2 &= 11 - 3t \end{aligned}$$

Let $x_3 = t$ be arbitrary

$$\begin{bmatrix} 1 & 1 \\ 2 & -1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} 8+t \\ 11-3t \end{bmatrix}$$

$$\begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} 1 & 1 \\ 2 & -1 \end{bmatrix}^{-1} \begin{bmatrix} 8+t \\ 11-3t \end{bmatrix}$$

$x_2 = 0$

$x_1 = t$

$x_2 = t$

$x_1 = 0$

$x_2 = t$

$x_1 = t$

$$3C_2 = \frac{3!}{2!} = 3$$

$t = 0$ $x_3 = 0$

$$\begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} 1 & 1 \\ 2 & -1 \end{bmatrix}^{-1} \begin{bmatrix} 8 \\ 11 \end{bmatrix} = \begin{pmatrix} 2.6 \\ 1.8 \end{pmatrix}$$

$$\begin{bmatrix} 2.6, 1.8, 0 \\ 1.8, 0, 3.7 \\ 0, 3.1, 1.7 \end{bmatrix}$$

$$\text{Max } Z = 15x_1 + 11x_2 - 26x_3$$

$$\text{Max } Z = 5x_1 + 2x_2 + 3x_3 - x_4 + x_5$$

s.t.

$$x_1 = \min \left(\frac{8}{1}, 7 \right)$$

$$x_4 = 8 - x_1 = 1x_1$$

$$\begin{cases} \underline{1}x_1 + \underline{2}x_2 + \underline{2}x_3 + \underline{1}x_4 = \underline{8} \\ \underline{3}x_1 + \underline{4}x_2 + \underline{1}x_3 + \underline{1}x_5 = \underline{7} \\ x_i \geq 0 \end{cases}$$

$$R_2 \rightarrow R_2 - 3R_1$$

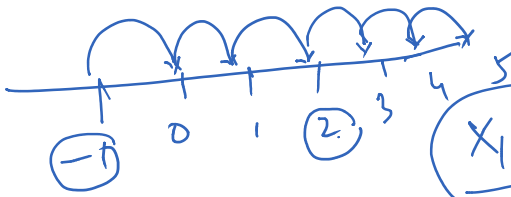
$$\begin{aligned} x_1 + 2x_2 + 2x_3 + x_4 &= 8 \\ 0x_1 + 2x_2 + 5x_3 + 3x_4 + x_5 &= -17 \end{aligned}$$

$$R_2 \rightarrow R_2 - \frac{1}{2}R_1$$

$$\begin{aligned} \frac{1}{2}x_1 + x_2 + x_3 + \frac{x_4}{2} &= 4 \\ 2\frac{1}{2}x_1 + 3x_2 + 0x_3 - \frac{1}{2}x_4 + x_5 &= 3 \end{aligned}$$

Step 1: Identify 2 basic variable

$$\text{value}(A) = Z$$



$$X_4 = 8, X_5 = 7$$

$$(0, 0, 0, 8, 7) \quad Z = -1$$

$$X_1 = 0$$

$$X_2 = 0$$

$$X_3 = 0$$

$$X_4 = 8, X_5 = 7$$

$$X_1 = 1$$

$$X_2 = 0$$

$$X_3 = 0$$

$$X_4 = 7, X_5 = 6$$

$$Z = 2$$

Jump of 3 units] profit

$$X_1 = 2, X_2 = X_3 = 0, X_4 = 6, X_5 = 1$$

$$Z = 5$$

jump of 6 units

$$X_1 = 3, X_2 = 0, X_3 = 0, X_4 = 5, X_5 = -2$$

$$X_1 = 7/3, X_2 = 0, X_3 = 0, X_4 = 8 - 7/3 = 17/3, X_5 = 0$$

