

$$\textcircled{1} \quad AB = \begin{bmatrix} 3 & 4 \\ 0 & 3 \end{bmatrix} \begin{bmatrix} -4 & -2 \\ -1 & -3 \end{bmatrix} = \begin{bmatrix} -28 & -18 \\ -12 & -9 \end{bmatrix}$$

$$BA = \begin{bmatrix} -4 & -2 \\ -1 & -3 \end{bmatrix} \begin{bmatrix} 3 & 4 \\ 0 & 3 \end{bmatrix} = \begin{bmatrix} -12 & -22 \\ -12 & -25 \end{bmatrix}$$

Because neither AB nor BA is an identity matrix B is not the multiplicative inverse of A .

$$\textcircled{2} \quad Z = 0.20x + 0.55y$$

Testing coordinates to see which point is a maximum

$$(0,0)$$

$$Z = 0 + 0 = 0$$

$$(0,3)$$

$$Z = 0.20(0) + 0.55(3) = 1.65$$

$$(4,8)$$

$$Z = 0.20(4) + 0.55(8) = 5.2$$

$$(7,6)$$

$$Z = 0.20(7) + 0.55(6) = 4.7$$

$$(9,0)$$

$$Z = 0.20 \times 9 + 0 = 1.8$$

$$3. \quad P = 8000$$

$$A = P(1+r)^n$$

$$n = 18 \times 4 = 72$$

$$r = \frac{7.4}{4} = 1.85$$

$$A = 8000 (1.0185)^{72} = 29942.25$$

$$29942.20$$

$\textcircled{4}$ Payments 600 per quarter
period 2 years
compounded quarterly
 $r = 5\%$

$$F = P \frac{(1+r)^n - 1}{r} \quad r = \frac{5}{4} = 1.25$$

$$F = \frac{600 (1.0125)^{84} - 1}{0.0125} \quad n = 2 \times 4 = 8$$

$$F = \frac{600 (1.0125)^{84} - 1}{0.0125} = 5015.30$$

$$5078.02$$

$\textcircled{5}$ Loan = 2100
 $r = 8\%$
compounded quarterly
12 quarterly payments

$$A = P \frac{i(1+i)^n}{(1+i)^n - 1}$$

$$n = 12$$

$$i = r = \frac{8}{4} = 2\%$$

$$A = 2100 \frac{(0.02(1+0.02)^{12})}{(1+0.02)^{12} - 1} = 198.60, 198.58$$

$$\begin{aligned} \textcircled{6} \quad & -10x - 6y - z = -40 \\ & -6x - 10y - 2z = -14 \\ & 8x + 6y + z = 30 \end{aligned}$$

shown at the end

$$\textcircled{7} \quad PV = PMT \left(\frac{1 - (1+r)^{-n}}{r} \right)$$

$$PMT = 13732$$

$$r = 7.2\% / 2 = 3.6\%$$

$$n = 8 \times 2 = 16$$

$$PV = 13732 \left(\frac{1 - (1.036)^{-16}}{0.036} \right) = 164836.10, \underline{164386.09}$$

$$\textcircled{8} \quad \begin{aligned} \text{Let no. of breaks} &= x \\ \text{no. of shocks} &= y \end{aligned}$$

$$2y + 2x \leq 48$$

$$x \geq 2$$

$$y \geq 6$$

$$\text{when } x=0, y=24$$

$$\text{when } y=0, x=24$$

$$\begin{aligned} \text{Income from generating} \\ \text{repairing 24 breakers} \\ = 24 \times 250 = 6000 \end{aligned}$$

$$\begin{aligned} \text{Income from shock} \\ \text{absorber alone} \\ = 24 \times 400 = 9600 \end{aligned}$$



Therefore Kevin should do 18 shocks and no brake replacement.

$$\begin{aligned} \textcircled{9} \quad & \text{Cost} = 22700 \\ & n = 4 \times 12 = 48 \\ & r = 6\% / 12 = 0.5\% = 0.005 \end{aligned}$$

$$A = P \frac{(i(1+i)^n)}{(1+i)^n - 1} = 22700 \frac{(0.005(1+0.005)^{48})}{(1+0.005)^{48} - 1} = 533.11$$

$$533.10$$

$$\text{Interest} = 533.11 \times 48 - 22700 = 2889.28$$

10) 2700
 $r = 10\%$
 $n = 2 \times 2 = 4$

Total $2700 \times \frac{10}{2}\% \times 4 = 540$

$\frac{540}{11} = 135$

11) $x + 2y + 3z = 29$
 $2x + 3y + 4z = 15$
 $-x - 2y - 4z = -21$

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

$B = \begin{bmatrix} 29 \\ 15 \\ 21 \end{bmatrix}$

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

$\begin{bmatrix} x \\ y \\ z \end{bmatrix} = A^{-1} B = \begin{bmatrix} -4 & 2 & -1 \\ 4 & -1 & 2 \\ -1 & 0 & 1 \end{bmatrix} \begin{bmatrix} 29 \\ 15 \\ 21 \end{bmatrix} = \begin{bmatrix} -65 \\ 59 \\ -8 \end{bmatrix}$

12.

12) $A = 1555$
 $r = 6.2/12 = 0.525\%$

$(1+r)^n P = A$
 $P = \frac{A}{(1+r)^n} = \frac{1555}{(1+0.00525)^7} = 1500$

13)
$$\begin{array}{ccc|c} x_1 & x_2 & x_3 & \\ \hline -10 & -6 & -1 & -40 \\ -6 & -10 & -2 & -14 \\ 8 & 6 & 1 & 30 \end{array}$$

divide through by -10 first row

$$\begin{array}{ccc|c} 1 & 0.6 & 0.1 & 4 \\ 0 & -6.4 & -1.4 & 10 \\ 0 & 1.2 & 0.2 & -2 \end{array}$$

eliminating first column

13.

14.

15

making the pivot in the second column

$$\begin{array}{ccc|c} x_1 & x_2 & x_3 & \\ 1 & 0.6 & 0.1 & 4 \\ 0 & 1 & 0.21875 & -1.5625 \\ 0 & 1.2 & 0.2 & -2 \end{array}$$

eliminate 2nd column

$$\begin{array}{ccc|c} 1 & 0 & -0.03125 & 4.9375 \\ 0 & 1 & 0.21875 & -1.5625 \\ 0 & 0 & -0.0625 & -0.125 \end{array}$$

making the pivot in the 3rd column by dividing 3rd row by -0.0625

$$\begin{array}{ccc|c} 1 & 0 & -0.03125 & 4.9375 \\ 0 & 1 & 0.21875 & -1.5625 \\ 0 & 0 & 1 & 2 \end{array}$$

eliminate 3rd column

$$\begin{array}{ccc|c} 1 & 0 & 0 & 5 \\ 0 & 1 & 0 & -2 \\ 0 & 0 & 1 & 2 \end{array}$$

13. $R = 8000$
 $r = 8\%$
 $n = 5$

$$FV = P \left(\frac{(1+r)^n - 1}{r} \right)$$

$$= 8000 \left(\frac{(1.08)^5 - 1}{0.08} \right) = 46932.81$$

14. $PV = ?$
 $FV = 300000$
 $r = 9\%$
 $n = 30$

$$FV = PV [1+r]^n$$

$$PV = \frac{FV}{(1+r)^n} = \frac{300000}{(1.09)^{30}} = 22611.35$$

15. $Z = 9x + 8y$
 $x + y \leq 8$
 $-x + y \leq 2$
 $2x - y \leq 10$

Graphically

$$x + y \leq 8$$

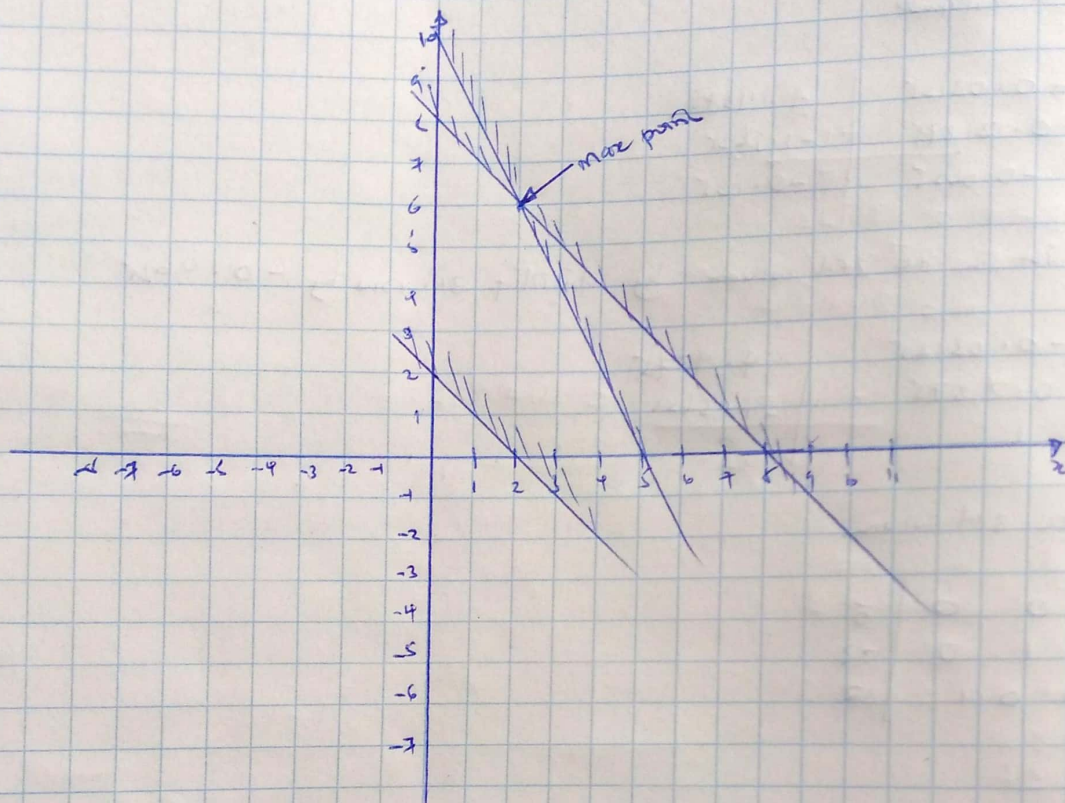
x	0	8
y	8	0

$$-x + y \leq 2$$

x	0	2
y	2	0

$$2x - y \leq 10$$

x	5	0
y	0	10



- a) No minimum value because it is not bounded to the left
- b) Max points are (2, 6)
- there $Z = 9x + 8y = 9(2) + 8(6) = 70$