

Where, $0 = (1 - 2x + y + z) * A - 3x + 4y + z =$

$$a = 18101064 \bmod 3$$

$$\textcircled{1} \quad \text{---} = 0 + 1 = 1$$

$$b = 18101064 \bmod 5 \quad (1) \text{ pro profit maxim. wohn}$$

$$= 4 \quad 0 = 0 + 0 - 0 - 0 - 4x + 0 + 0 + 1$$

$$c = 18101064 \bmod 7$$

$$= 2$$

$$0 = 4x + 0 - 1 =$$

$$1 = 4x =$$

$$f(x, y, z) = x + 4y + 2z \rightarrow \text{objective function}$$

$$g(x, y, z) = x + y + z = 2 \rightarrow \text{Constraint wohn}$$

Lagrange Multiplier Method, $0 = 0 + 1 + 0$

$$\nabla f(x, y, z) = \lambda * g(x, y, z) \quad 1 = 4y =$$

$$f(x, y, z) - \lambda * g(x, y, z) = 0$$

[$\lambda \sim$ slack variable]

$$\Rightarrow x + 4y + 2z - \lambda(x^2 + y^2 + z^2 - 2) = 0$$

$$\Rightarrow x + 4y + 2z - x^2\lambda - y^2\lambda - z^2\lambda + 2\lambda = 0 \quad \text{--- (1)}$$

Now differentiating eqn (1) partially by x ,

$$1 + 0 + 0 - 2x\lambda - 0 - 0 - 0 + 0 = 0$$

$$\Rightarrow 1 - 2x\lambda = 0$$

$$\Rightarrow 2x\lambda = 1$$

$$\Rightarrow x = \frac{1}{2\lambda}$$

Now Partially by y ,

$$0 + 4 + 0 - 0 - 2y\lambda - 0 + 0 = 0$$

$$\Rightarrow 2y\lambda = 4$$

$$\Rightarrow y = \frac{4}{2\lambda}$$

$$\Rightarrow y = \frac{2}{\lambda}$$

Now, Partially differentiate by z

$$0 + 0 + 2 - 0 - 0 - 2z\lambda + 0 = 0$$

$$\Rightarrow 2z\lambda = 2$$

$$\Rightarrow z = \frac{2}{2\lambda}$$

$$\Rightarrow z = \frac{1}{\lambda}$$

Now,

$$x^v + y^v + z^v = 2$$

$$\Rightarrow \left(\frac{1}{2\lambda}\right)^v + \left(\frac{2}{\lambda}\right)^v + \left(\frac{1}{\lambda}\right)^v = 2$$

$$\Rightarrow \frac{1}{4\lambda^v} + \frac{4}{\lambda^v} + \frac{1}{\lambda^v} = 2$$

$$\Rightarrow \frac{1 + 16 + 4}{4\lambda^v} = 2$$

$$\Rightarrow \frac{21}{4\lambda^v} = 2$$

$$\Rightarrow 8\lambda^v = 21$$

$$\Rightarrow r = \frac{21}{8}$$

$$\Rightarrow r = \pm \sqrt{\frac{21}{8}}$$

$$= \pm \sqrt{2.625}$$

$$= \pm 1.62$$

$$\text{When } r = \pm 1.62$$

$$u = \frac{1}{2 \times 1.62}$$

$$= 0.31$$

$$v = \frac{2}{2.62 \times 1.62}$$

$$= 0.76$$

$$z = \frac{1}{1.62}$$

$$= 0.61$$

when $\lambda = \frac{(10.0 - 15.0)}{2} = -1.62$

$$\lambda = \frac{1}{2 * (-1.62)}$$

$$= -0.31$$

$$y = \frac{2}{-1.62}$$

$$z = -1.23$$

$$z = \frac{1}{-1.62}$$

$$z = -0.61$$

Now,

$$G(y, z) = (0.31, 1.23, 0.61)$$

$$f(G(y, z)) = (0.31 + 4 * 1.23 + 2 * 0.61)$$

$$= 6.45$$

$$(x, y, z) = (-0.31, -1.23, -0.61)$$

$$f(x, y, z) = (-0.31) + 4(-1.23) + 2(-0.61)$$

$$= -6.45$$

$$\text{So, Max} = 6.45$$

$$\text{Min} = -6.45$$

$$(10.0, 25.1, 15.0) = (x, y, z)$$

$$f(x, y, z) = (10.0 \times 5 + 25.1 \times 4 + 15.0 \times 2) = 201.4$$