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18/BMS061003

Computer Science

MAT 101

Question 1

The sum of three numbers AP is 18 and the sum of their squares is 206 find numbers

Sol

Three numbers  $x, y, z$

$$x + y + z = 18$$

$$x^2 + y^2 + z^2 = 206$$

~~Let~~  $x = a$

$$y = a + d$$

$$z = a + 2d$$

$$a + a + d + a + 2d = 18$$

$$\frac{3a + 3d}{3} = \frac{18}{3}$$

$$a + d = 6$$

$$a = 6 - d$$

$$x^2 + y^2 + z^2 = 206$$

$$a^2 + (a + d)^2 + (a + 2d)^2 = 206$$

$$a^2 + a^2 + 2ad + d^2 + a^2 + 4ad + 4d^2 = 206$$

$$3a^2 + 6ad + 5d^2 = 206$$

$$a = 6 - d$$

$$3(6-d)^2 + 6(6-d) + 5d^2 = 206$$

$$3(36 - 12d + d^2) + (36 - 6d)d + 5d^2 = 206$$

$$108 - 36d + 3d^2 + 36d - 6d^2 + 5d^2 = 206$$

$$3d^2 - 6d^2 + 5d^2 - 36d + 36d + 108 - 206 = 0$$

$$2d^2 - 98 = 0$$

$$\frac{2d^2}{2} = \frac{98}{2}$$

$$d^2 = 49$$

$$\sqrt{d^2} = \sqrt{49}$$

$$d = \pm 7$$

$$a = 6 - d$$

$$a = 6 - 7$$

$$a = -1$$

$$\text{or } 6 - (-7)$$

$$\text{or } 13$$

$$x = -1 \text{ or } 13$$

$$y = a + d$$

$$y = -1 + 7 \quad \text{or} \quad 13 + (-7)$$

$$y = 6 \quad \text{or} \quad 6$$

$$T = a + 2d$$

$$z = -1 + 2(7) \quad \text{or} \quad 13 + 2(-7)$$

$$z = 13 \quad \text{or} \quad -1$$

Find three numbers in A.P whose sum is 28 and product is 512.

Sol

Three numbers  $x, y, T$

$$x = a$$

$$y = ar$$

$$T = ar^2$$

$$a + ar + ar^2 = 28$$

$$a(1 + r + r^2) = 28$$

$$a = \frac{28}{1 + r + r^2}$$

$$a + ar + ar^2$$

$$x \times y \times T = 512$$

$$a \times ar \times ar^2 = 512$$

$$\frac{a^3 r^3}{r^3} = 512$$

$$a^3 = 512$$

$$a^3 = \frac{812}{r^3}$$

$$a = \frac{8}{r}$$

$$a = \frac{28}{1+r+r^2}$$

$$\frac{8}{r} = \frac{28}{1+r+r^2}$$

$$28r = 8 + 8r + 8r^2$$

$$8 + 8r + 8r^2 - 28r = 0$$

$$8r^2 - 20r + 8 = 0$$

$$2r^2 - 5r + 2 = 0$$

$$2r^2 - 4r - r + 2 = 0$$

$$2r(2r-2) - 1(2r-2) = 0$$

$$(2r-2)(2r-1) = 0$$

$$r = 2 \quad r = \frac{1}{2}$$

$$a = \frac{8}{r}$$

$$= \frac{8}{2} \quad \text{or} \quad \frac{8}{1/2}$$

$$a = 4 \quad \text{or} \quad 16$$

$$a = 16, 4$$

$$s = a \cdot s$$

$$s = 16 \times 1/2 \quad \text{or} \quad s = 4 \times 2$$

$$s = 8 \quad \text{or} \quad s = 8$$

$$T = a \cdot s^2$$

$$T = 16 \times (1/2)^2 \quad \text{or} \quad T = 4 \times 2^2$$

$$T = 4 \quad \text{or} \quad T = 16$$