

# ITC 2192 - Mathematics For ICT

## Assignment No. 1

ICT/22/814

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①

$$a_1 = -5$$

$$a_2 = -5 + 3 = -2$$

$$a_3 = -2 + 3 = 1$$

$$a_4 = 1 + 3 = 4$$

$$a_5 = 4 + 3 = 7$$

$$a_n = a_1 + d(n-1)$$

$$= -5 + 2(n-1)$$

$$= -5 + 2n - 2$$

$$a_n = 2n - 7$$

$$a_{30} = 2 \times 30 - 7$$

$$= 53$$

Explicit formula is the most efficient here.

Because by just knowing position only, we can find any term.

$$\text{iv} \quad -5 \xrightarrow{+2} -2 \xrightarrow{+2} 1 \xrightarrow{+2} 4 \xrightarrow{+2} 7 \quad d = 2$$

This is an Arithmetic sequence.

Because every adjacent terms have a common difference ( $d=2$ )

$$\text{v} \quad S_n = \frac{n}{2} (2a_1 + (n-1)d)$$

$$= \frac{30}{2} (2 \times -5 + (30-1)2)$$

$$= 15 (-10 + 58)$$

$$= 675$$

②

$$i. a \sum_{r=1}^n [rC_{r+1}] = \frac{1}{3}(n+1)(n+2)$$

$$\frac{\sum_{r=1}^n r^2 + r}{\sum r^2 + \sum r}$$

$$\frac{n(n+1)(2n+1)}{6} + \frac{n(n+1)}{2}$$

$$\frac{n(n+1)(2n+1) + 3n(n+1)}{6}$$

$$\frac{2n^3 + 3n^2 + n + 3n^2 + 3n}{6}$$

$$\frac{2n^3 + 6n^2 + 4n}{6}$$

$$\frac{n^3 + 3n^2 + 2n}{3}$$

$$\frac{1}{3}(n^2 + 3n + 2)$$

$$= \frac{1}{3}(n+1)(n+2)$$

$$\therefore \sum [rC_{r+1}] = \frac{1}{3}(n+1)(n+2)$$

$$i. b \sum_{r=1}^n (4r^3 - 3r^2 + r) = An^3(n+1)$$

$$\sum 4r^3 - \sum 3r^2 + \sum r$$

$$4\sum r^3 - 3\sum r^2 + \sum r$$

$$4 \cdot \frac{n^2(n+1)^2}{4} - 3 \cdot \frac{n(n+1)(2n+1)}{6} + \frac{n(n+1)}{2}$$

$$n^2(n+1)^2 - \frac{(n^2+n)(2n+1)}{2} + \frac{n(n+1)}{2}$$

$$\frac{2n^4 + 4n^3 + 2n^2 - 2n^3 - 3n^2 - n + n^2 + n}{2}$$

$$\frac{2n^4 + 2n^3}{2}$$

$$n^4 + n^3$$

$$n^3(n+1)$$

$$= 1n^3(n+1)$$

$$A = 1$$

$$\therefore \sum (4r^3 - 3r^2 + r) = An^3(n+1)$$

$$ii. a \prod_{i=1}^{10} i e^i$$

$$= \prod_{i=1}^{10} i \times \prod_{i=1}^{10} e^i$$

$$= (1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7 \times 8 \times 9 \times 10) \times (e^1 \times e^2 \times e^3 \times e^4 \times e^5 \times e^6 \times e^7 \times e^8 \times e^9 \times e^{10})$$

$$= 3,628,800 \times e^{55}$$

$$= 3,628,800$$

$$\times 7.694785 \times 10^{23}$$

$$= 2,79228 \times 10^{30}$$



$$b \quad \prod_{k=1}^6 \frac{3^k}{k+1}$$

$$\prod_{k=1}^6 3^k \times \prod_{k=1}^6 \frac{1}{k+1} \times \prod_{k=1}^6 \frac{1}{k}$$

$$3^6 \times 6! \times \left( \frac{1}{2} \times \frac{1}{3} \times \frac{1}{4} \times \frac{1}{5} \times \frac{1}{6} \times \frac{1}{7} \right)$$

$$729 \times 720 \times \frac{1}{5040}$$

$$= 104.1428571 //$$

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$$i \quad S = \{x : x \text{ is an even natural number, } x \leq 10\}$$

$$ii \quad P = \{5, 10, 15, 20, 25, 30\}$$

$$Q = \{-2, 1, 6, 13, 22\}$$

$$R = \{5, 25, 125, 625\}$$

iii

$$P \cap R = \{5, 25\}$$

$$P \oplus R = \{10, 15, 20, 30\}$$

$$Q \oplus S = \{-2, 4, 1, 8, 10, 13, 22\}$$

$$(Q \cap S) \cup (P \cap R) = \{6, 5, 25\}$$

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{5, 25}