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# Discrete Mathematics

## Topik A Nomor 7

7) Buktikan bahwa jika $n$ bilangan bulat positif, maka :

$$S_n = 1 + \frac{1}{3} + \frac{1}{9} + \ldots + \left(\frac{1}{3}\right)^{n-1} = \frac{3}{2}\left[1 - \left(\frac{1}{3}\right)^n\right]$$

### Induksi Matematika

Anggap $P(n)$ adalah jumlah dari ~~baris~~ suku pertama sampai suku ke-$n$

$$P(1) \rightarrow \left(\frac{1}{3}\right)^{1-1} = \frac{3}{2}\left(1 - \left(\frac{1}{3}\right)^1\right)$$

$$1 = \frac{3}{2}\left(\frac{2}{3}\right)$$

$$\boxed{1 = 1} \text{ Benar}$$

$$P(k) \rightarrow 1 + \frac{1}{3} + \frac{1}{9} + \ldots + \left(\frac{1}{3}\right)^{k-1} = \boxed{\frac{3}{2}\left[1 - \left(\frac{1}{3}\right)^k\right]}$$

Benar
~~Dianggap Benar~~

~~$P(k+1) \rightarrow 1 + \frac{1}{3} + \ldots + k$~~

$$P(k+1) \rightarrow 1 + \frac{1}{3} + \ldots + \left(\frac{1}{3}\right)^{k-1} + \left(\frac{1}{3}\right)^k = \frac{3}{2}\left[1 - \left(\frac{1}{3}\right)^{k+1}\right]$$

$$= \frac{3\left[1 - \left(\frac{1}{3}\right)^{k+1}\right]}{2}$$

$$= \frac{3 - 3\left(\frac{1}{3}\right)^{k+1}}{2}$$

$$= \frac{3 - \left(\frac{1}{3}\right)^{-1} \cdot \left(\frac{1}{3}\right)^{k+1}}{2} = \boxed{\frac{3 - \left(\frac{1}{3}\right)^k}{2}}$$

Dianggap Benar karena $P(k)$ Benar

Tambahkan $P(k)$ dengan suku ke-$(k+1)$

$$= \frac{3}{2}\left[1 - \left(\frac{1}{3}\right)^k\right] + \left(\frac{1}{3}\right)^k$$

$$= \frac{3\left[1 - \left(\frac{1}{3}\right)^k\right] + 2\left(\frac{1}{3}\right)^k}{2}$$

$$= \frac{3 - 3\left(\frac{1}{3}\right)^k + 2\left(\frac{1}{3}\right)^k}{2} = \frac{3 - \left(3\left(\frac{1}{3}\right)^k - 2\left(\frac{1}{3}\right)^k\right)}{2}$$

$$= \boxed{\frac{3 - \left(\frac{1}{3}\right)^k}{2}}$$

persamaan di atas sama dengan $P(k+1)$ // sehingga terbukti Benar.

Discrete Mathematics

Topik B Nomor 7

7.) Tentukan Invers dari ekspresi modulo berikut.

$10 \pmod{143}$

Invers

$x \equiv 10^{-1} \pmod{143}$
$x \equiv \frac{1}{10} \pmod{143}$

$10x \equiv 1 \pmod{143} \rightarrow x = 43$

$\boxed{430 \equiv 1 \pmod{143}}$

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