ДЧС 04.10.12

$$(a+b)^n = \sum_{k=0}^{n} \binom{n}{k} a^k b^{n-k}$$

$a, b \in \mathbb{R}$, $n \in \mathbb{N}$

където $\binom{n}{k} = \frac{n!}{k!(n-k)!}$ и $n! = n(n-1)\ldots 2 \cdot 1$

при $n = 1$ =>

$$(a+b)^1 = \sum_{k=0}^{1} \binom{1}{k} a^k b^{1-k} = \binom{1}{0} a^0 b^{1-0} + \binom{1}{1} a^1 b^{1-1} =$$

$$\binom{1}{0} 1 \cdot b + \binom{1}{1} a^1 b^0 = b + a \text{ или } a+b$$

$$\binom{1}{0} = 1 \quad \text{и} \quad \binom{1}{1} = 1$$

да се докаже че

$$(a+b)^{n+1} = \sum_{k=0}^{n+1} \binom{n+1}{k} a^k b^{n-k+1}$$

от условие

$$(a+b)(a+b)^n = (a+b) \sum_{k=0}^{n} \binom{n}{k} a^k b^{n-k}$$

$\binom{n}{k} + \binom{n}{k+1} = \binom{n+1}{k+1}$ $\quad \binom{n}{0} = 1, \binom{n}{n} = 1$

$$\sum_{k=0}^{n} \binom{n}{k} a^{k+1} b^{n-k} + \sum_{k=0}^{n} \binom{n}{k} a^{k} b^{n+1-k}$$

при $k = 0$

$$\binom{n}{0} b^{n+1} + \sum_{k=0}^{n} \binom{n}{k} a^{k} b^{n-k} + \sum_{k=1}^{n} \binom{n}{k} a^{k} b^{n+1-k}$$

~~Пусть $n = k$~~ Пусть $k = n+1$

$$b^{n+1} + \sum_{k=0}^{n} \binom{n}{k} a^{k} b^{n-k} + \sum_{n=0}^{n-1} \binom{n}{n+1} a^{n+1} b^{n+1-n-1}$$

$$b^{n+1} + \binom{n}{n} a^{n+1} + \sum_{k=0}^{n-1} \left[\binom{n}{k} + \binom{n}{k+1} \right] a^{k+1} b^{n-n}$$

$$a^{n+1} + b^{n+1} + \sum_{k=0}^{n-1} \binom{n+1}{k+1} a^{k+1} b^{n-k}$$

$$\binom{n+1}{0} a^{n+1} + \sum_{k=0}^{n-1} \binom{n+1}{k+1} a^{k+1} b^{n-k} + \binom{n+1}{n+1} b^{n+1}$$

пусть $k+1 = p$

$$\binom{n+1}{0} a^{n+1} + \sum_{p=1}^{n} \binom{n+1}{p} a^{p} b^{n-p+1} + \binom{n+1}{n+1} b^{n+1} =$$

$$\sum_{p=0}^{n+1} \binom{n+1}{p} a^{p} b^{n-p+1}$$

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Нютонов бином

$$\sum_{k=0}^{n} \binom{n}{k} \left(\sum_{k=0}^{n} \binom{n}{k} (-1)^k = 0 \right)$$

Ако $n_1 < n_2 < \dots < n_k < n_{k+1} < \dots$

където $n_k \in \mathbb{N}$ и $\forall k \in \mathbb{N}$ то $k \leq n_k$

Полиноми

$$a^m b^q c^p \Rightarrow p+q+m = n$$

Индукция по k

при $k = 1$

$1 \leq n_1$ - изпълнено

Да се докаже

$$k+1 \leq n_{k+1}$$

Щом $k \geq n_k$ то $k+1 \leq n_{k+1}$

Ако докажем че не е вярно $k+1 \leq n_{k+1}$

и $k+1 > n_{k+1} \Rightarrow n_{k+1} < k+1 \leq n_{k+1}$

или $n_{k+1} - n_k < 1 \Rightarrow n_{k+1} = n_k$ Не вярно

↯ Не е в сила от условието

Комплексни числа

$\mathbb{C} = \mathbb{R} \times \mathbb{R}$

точна горна граница

$\forall \varepsilon > 0 \; \exists \; m \in M$ така че $a - \varepsilon < m < a$

m - множество

точна долна граница

$a < m < a + \varepsilon$ за $\forall \varepsilon > 0 \; \exists \; m \in \mathbb{N}$ така че

$0 < \frac{1}{m} < \varepsilon$