Pís 8.4 ZS   AK Σ, NAK Σ, Per prom fces | substituce

30 min   Open book

$$\frac{\frac{1}{a}+\frac{1}{b}}{\frac{1}{a}-\frac{1}{b}}$$ převést na rac. funkci

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$\sum x_n$ $x_n \in \mathbb{C}$

$x_n = a_n + i b_n$

$\sum a_n$ K $\sum b_n$ K $\sum a_n + i b_n$

$$\sum_{n=1}^{\infty} \frac{1}{n^2+2i} = \sum \frac{1}{n^2+2i} \cdot \frac{n^2-2i}{n^2-2i} = \sum \frac{n^2-2i}{n^4-4i^2}$$

$$= \sum \frac{n^2-2i}{n^4+4} = \sum \underbrace{\frac{n^2}{n^4+4}}_{a_n} + i \underbrace{\frac{-2}{n^4+4}}_{b_n}$$

a_n K, LSK $\frac{1}{n^2}$ b_n K, LSK $\frac{1}{n^4}$

Závěr: $\sum \frac{1}{n^2+2i}$ K

$\sum |x_n|$ K $\Rightarrow$ $\sum x_n$ K

$$\sum \frac{(i+2)^n}{10^n} \qquad \sum \left| \frac{(i+2)^n}{10^n} \right| =$$ AK

$$\sum \frac{|i+2|^n}{10^n} = \underbrace{\sum \frac{(\sqrt{5})^n}{10^n}}_{K}$$

geom. Σ $\Rightarrow \sum \frac{(i+2)^n}{10^n}$ K

z $\quad \sum a_n + i b_n \quad \sqrt{a_n^2 + b_n^2} \leq$

$\sum |a_n| \quad \sum |b_n|$

$\sqrt{a_n^2} \quad \sqrt{b_n^2}$ ✓

$$\sum_{n=1}^{\infty} \frac{e^{in\varphi}}{n}$$

φ param. $\quad \sum \left| \frac{e^{in\varphi}}{n} \right| = \sum \frac{1}{n}$

D

$$r e^{i\alpha} = r(\cos\alpha + i \sin\alpha)$$

$$|\cos\alpha + i \sin\alpha|$$

$$\sum \frac{1}{n} \cos(n\varphi) + i \frac{1}{n} \sin n\varphi$$

$\varphi \neq 0 + 2k\pi, \; k \in \mathbb{Z}$

$\sum \frac{\cos(n\varphi)}{n}$ K $\quad \sum \frac{\sin n\varphi}{n}$ K

$\frac{1}{n} \searrow 0 \quad \cos(n\varphi)$

ohr. č. s.

Závěr $\quad \sum \frac{e^{in\varphi}}{n}$ $K \iff \varphi \neq 2k\pi$

$k \in \mathbb{Z}$

$\int$ Integrale — PF

$\downarrow f$

der

f'

x^2

$\downarrow$

$2x$

$2x$

$\int$

$x^2 + 1$

$-e$

$x^2 + c$

$x^2 + 2$

$$\int 3x^2 dx = x^3 + c \qquad x \in (-\infty, \infty)$$

$$\int \cos x \, dx \overset{c}{=} \sin x \qquad x \in \mathbb{R}$$

$$\int e^x dx = e^x \qquad x \in \mathbb{R}$$

$$\int \sqrt[3]{x} \, dx = \int x^{1/3} dx = \frac{x^{1/3 + 1}}{1/3 + 1} = \frac{x^{4/3}}{4/3}$$

$$= \frac{3}{4} \sqrt[3]{x^4} \qquad x \in \mathbb{R}$$

$$\int \frac{1}{1+x^2} + \frac{1}{\sqrt{1-x^2}} \, dx =$$

$$\int \frac{1}{1+x^2} dx + \int \frac{1}{\sqrt{1-x^2}} dx \overset{c}{=} \arctan x + \arcsin x$$

$$\int \frac{2}{x} dx = 2 \int \frac{1}{x} dx \overset{c}{=} 2 \ln |x|$$

$$\int \frac{1}{\sqrt{1-x^2}} = \begin{cases} \arcsin x \\ -\arccos x \end{cases}$$

$$\int \sqrt{x}\,dx = \frac{2}{3} x^{3/2} + c = \frac{2}{3} \sqrt[2]{x^3} + c$$

$$\hat{=} \quad x^{3/2} \qquad = \frac{2}{3} \sqrt{x^3}$$

$$\int e^{2x+1}\,dx \hat{=} \frac{1}{2} e^{2x+1}$$

$$\frac{1}{2} e^{2x+1} \cdot 2$$

$ax+b$

$2x-3$

$-x+7$

~~x^2+x+5~~

$\frac{x}{50}+\pi$ ✓

$$\int \frac{1}{1+9x^2} = \int \frac{1}{1+(3x)^2} =$$

$$= \frac{1}{3} \arctan(3x) + c$$