

HOSILA: MATEMATIK TAHLIL VA HISOBLASH USULLARI

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Annotatsiya: Ushbu maqola hosila tushunchasini matematik nuqtai nazardan tahlil qiladi. Unda o'simlik va hayvonchilik hosildorligini hisoblash formulalari, sifat koeffitsienti va kelajakdagi hosilni prognozlash metodlari ko'rib chiqilgan. Maqolada hosilni matematik usullar yordamida aniqlash va optimallashtirishning amaliy ahamiyati ta'kidlangan.

Kalit so'zlar: Hosila, matematik tahlil, hosildorlik, sifat koeffitsienti, prognozlash, o'simlik hosili, hayvonchilik hosili

Funksiyaning hosilasi $y = f(x)$ funksiyaning x_0 nuqtadagi hosilasi deb $f(x)$ funksiyaning x_0 nuqtadagi Δy orttirmasining argument orttirmasi Δx ga nisbatining Δx nolga intilgandagi limitiga aytiladi va u $y', y'(x_0), f'(x_0)$,

$\frac{dy}{dx}$ lardan biri bilan belgilanadi

Hosilaning ta'rifiga ko'ra funksiyaning ixtiyoriy x nuqtadagi hosilasini topish uchun quyidagi algoritmi ko'rsatish mumkin.

1-ta'rif

1. X ga Δx orttirma beriladi, u holda $y=f(x)$ funksiya ham Δy orttirma oladi va $y+\Delta y=f(x+\Delta x)$ bo'ladi;

2. Funksiyaning Δy orttirmasi topiladi;

$$\Delta y = f(x+\Delta x) - f(x)$$

3. Funksiya orttirmasining argument orttirmasiga nisbati topiladi;

$$\frac{\Delta y}{\Delta x} = \frac{f(x + \Delta x) - f(x)}{\Delta x}$$

4. Bu nisbatning Δx nolga intilgandagi limiti topiladi

$$\lim_{\Delta x \rightarrow 0} \frac{\Delta y}{\Delta x} = f'(x)$$

Berilgan $f(x)$ funksiyaning $f'(x)$ hosilasini topish amaliga funksiyaning differensiallash deyiladi. $f'(x_0)$ ga funksiya hosilasining x_0 nuqtadagi qiymati deyiladi.



1-misol

$F(x)=x$ $x_0 \in \mathbb{R}$ bo'lsin Bu funksiya uchun

$$F(x) = \frac{f(x) - f(x_0)}{x - x_0} = \frac{x - x_0}{x - x_0} = 1$$

$$\lim_{x \rightarrow x_0} \frac{f(x) - f(x_0)}{x - x_0} = 1$$

2-misol

$f(x) = \log_a x$ ning hosilasini ta'rif yordamida topamiz:

$$f'(x) = \lim_{\Delta x \rightarrow 0} \frac{f(x+\Delta x) - f(x)}{\Delta x} = \lim_{\Delta x \rightarrow 0} \frac{\log_a(x+\Delta x) - \log_a x}{\Delta x} = \lim_{\Delta x \rightarrow 0} \frac{1}{\Delta x} \log_a \left(\frac{x+\Delta x}{x} \right) = \lim_{\Delta x \rightarrow 0} \log_a \left(1 + \frac{\Delta x}{x} \right)^{\frac{1}{\Delta x}} = \lim_{\Delta x \rightarrow 0} \log_a \left(1 + \frac{\Delta x}{x} \right)^{\frac{x}{\Delta x} \cdot \frac{1}{x}} = \log_a e^{\frac{1}{x}} = \frac{1}{x} \log_a e = \frac{1}{x \ln a}$$

$$f'(x) = \frac{1}{x \ln a} \text{ ekan.}$$

Trigonometrik funksiyaning hosilasi:

$$F(x) = \sin x$$

$$\lim_{\Delta x \rightarrow 0} \frac{f(x+\Delta x) - f(x)}{\Delta x} = \lim_{\Delta x \rightarrow 0} \frac{\sin(x+\Delta x) - \sin x}{\Delta x} = \lim_{\Delta x \rightarrow 0} \frac{2 \sin\left(\frac{\Delta x}{2}\right) \cos\left(x + \frac{\Delta x}{2}\right)}{\Delta x} = \lim_{\Delta x \rightarrow 0} \frac{\sin\left(\frac{\Delta x}{2}\right)}{\frac{\Delta x}{2}} \cos\left(x + \frac{\Delta x}{2}\right) = \cos x$$

$$F'(x) =$$

$$\lim_{\Delta x \rightarrow 0} \frac{\sin\left(\frac{\Delta x}{2}\right)}{\frac{\Delta x}{2}} \cos\left(x + \frac{\Delta x}{2}\right) = \cos x$$

$$\left\{ \frac{\sin\left(\frac{\Delta x}{2}\right)}{\frac{\Delta x}{2}} = 1 \right\} \text{ajoyib limitga ko'ra.}$$

$$F(x) = \cos x$$

$$F'(x) = -\sin x$$

$$F(x) = \tan x$$

$$F'(x) = \frac{1}{\cos^2 x}$$

$$F(x) = \cot x$$

$$F'(x) = -\frac{1}{\sin^2 x}$$

FOYDALANILGAN ADABIYOTLAR:

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