

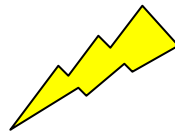
Turunan Fungsi Trigonometri

Beberapa rumus turunan fungsi trigonometri adalah:

A. $f(x) = \sin x$ adalah fungsi trigonometri dalam sinus, turunannya adalah:

$$\begin{aligned} f'(x) &= \lim_{h \rightarrow 0} \frac{\sin(x+h) - \sin x}{h} \\ &= \lim_{h \rightarrow 0} \frac{2 \cos\left(x + \frac{1}{2}h\right) \sin \frac{1}{2}h}{h} \\ &= \lim_{h \rightarrow 0} \frac{\cos\left(x + \frac{1}{2}h\right) \sin \frac{1}{2}h}{\frac{1}{2}h} \\ &= \lim_{h \rightarrow 0} \cos\left(x + \frac{1}{2}h\right) \cdot \lim_{h \rightarrow 0} \frac{\sin \frac{1}{2}h}{\frac{1}{2}h} \\ &= \cos(x+0) \cdot 1 \\ &= \cos x \end{aligned}$$

matikzone.com
28/07/2013

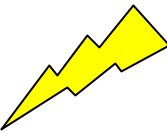


jadi, $f(x) = \sin x \Rightarrow f'(x) = \cos x$

B. $f(x) = \cos x$ adalah fungsi trigonometri dalam cosinus, turunannya adalah:

$$\begin{aligned} f'(x) &= \lim_{h \rightarrow 0} \frac{\cos(x+h) - \cos x}{h} \\ &= \lim_{h \rightarrow 0} \frac{-2 \sin\left(x + \frac{1}{2}h\right) \sin \frac{1}{2}h}{h} \\ &= \lim_{h \rightarrow 0} \frac{-\sin\left(x + \frac{1}{2}h\right) \sin \frac{1}{2}h}{\frac{1}{2}h} \end{aligned}$$

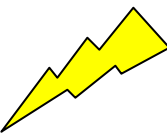
$$\begin{aligned}
 &= \lim_{h \rightarrow 0} -\sin\left(x + \frac{1}{2}h\right) \cdot \lim_{h \rightarrow 0} \frac{\sin \frac{1}{2}h}{\frac{1}{2}h} \\
 &= -\sin(x+0) \cdot 1 \\
 &= -\sin x
 \end{aligned}$$

jadi, $f(x) = \cos x \Rightarrow f'(x) = -\sin x$ 

C. $f(x) = \tan x$ adalah fungsi trigonometri dalam tangen, turunannya adalah:

$$f(x) = \tan x = \frac{\sin x}{\cos x}; u = \sin x, v = \cos x$$

$$\begin{aligned}
 f'(x) &= \frac{u'v - uv'}{v^2} \\
 &= \frac{\cos x \cdot \cos x - \sin x(-\sin x)}{(\cos x)^2} \\
 &= \frac{\cos^2 x + \sin^2 x}{(\cos x)^2} \\
 &= \frac{1}{(\cos x)^2} \\
 &= \sec^2 x
 \end{aligned}$$

jadi, $f(x) = \tan x \Rightarrow f'(x) = \sec^2 x$ 

PR:

Dengan cara yang sama dalam menentukan turunan fungsi tangen, tentukan turunan dari fungsi-fungsi berikut.

- $f(x) = \sec x$
- $f(x) = \operatorname{cosec} x$
- $f(x) = \operatorname{cotan} x$