Turunan Fungsi

Monday, August 23, 2010
11:39 AM

Kemiringan Garis.

NAIK

Perubahan garis

Gradien
Slope

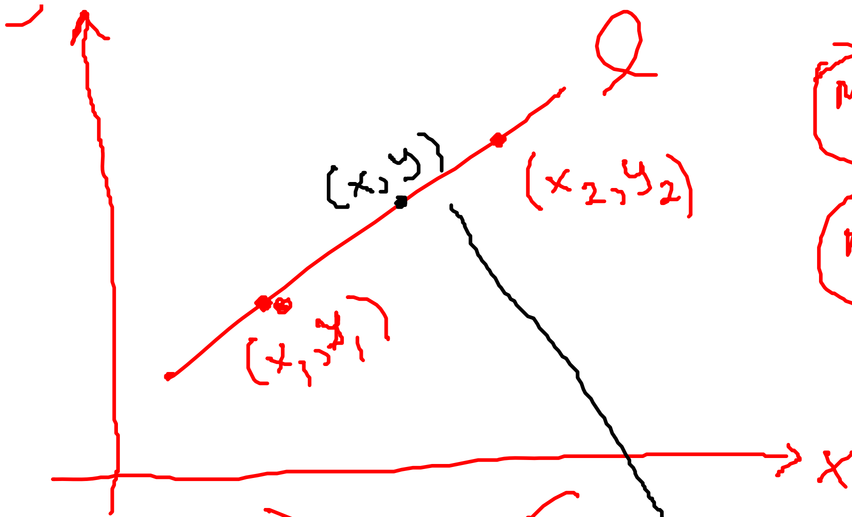
m =

MENDATAR

TURUN

TEGAK / VERTIKAL

y



$\cancel{M = y_2 - y_1}$

$\cancel{m = x_2 - x_1}$

$\cancel{m = \frac{y_2}{y_1}}$

$\cancel{m = \frac{y_2}{x_1}}$

$\cancel{m = \frac{y_2 - y_1}{x_2 - x_1}}$

$$\boxed{M = \frac{y_2 - y_1}{x_2 - x_1}}$$

$$\boxed{M = \frac{y - y_1}{x - x_1}}$$

$$\boxed{y - y_1 = m(x - x_1)}$$

$$\Rightarrow \boxed{y = m(x - x_1) + y_1}$$

Persamaan garis Q.

$$M = \frac{y_2 - y}{x_2 - x} \Rightarrow m(x_2 - x) = y_2 - y$$

$$\Rightarrow y = m(x - x_2) + y_2$$

1) Tentukan persamaan garis l yg melalui titik $(2,3)$ dan $(4,7)$

Jawab:

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{7-3}{4-2} = \frac{4}{2} = 2$$, sehingga diperoleh

pers. garis: $y = m(x - x_1) + y_1$

$$\Rightarrow y = 2(x-2) + 3 \Rightarrow y = 2x - 4 + 3$$

$$\Rightarrow \boxed{y = 2x - 1}$$

2) Tentukan persamaan garis yg memiliki kemiringan $m = 3$ dan melalui titik $(1,4)$

Jawab:

$$y = m(x - x_1) + y_1 = 3(x-1) + 4 \Rightarrow y = 3x - 3 + 4$$

$$\Rightarrow \boxed{y = 3x + 1}$$

3). Tentukan

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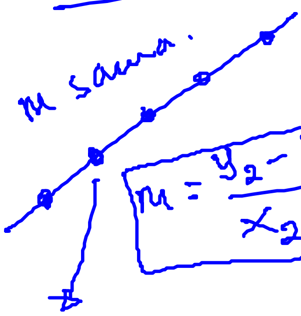
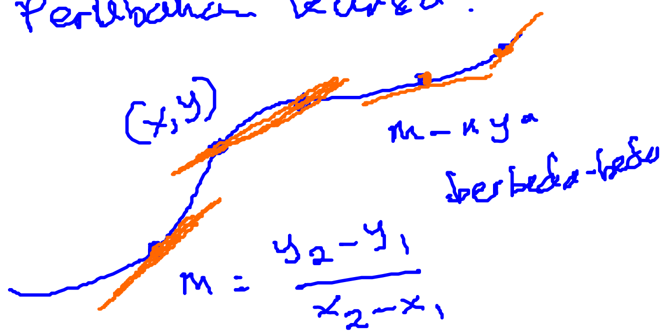
KURVA.

→ Kemiringan kurva
→ Perubahan kurva.



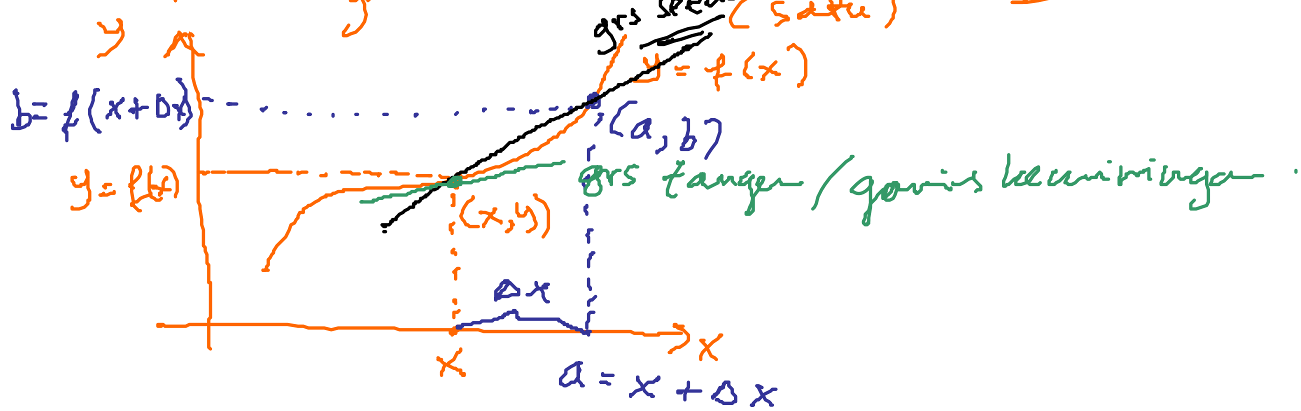
$$\boxed{m = \frac{y_2 - y_1}{x_2 - x_1}}$$



$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Kemiringan bisa dihitung menggunakan 2 Titik.

Kemiringan kurva di suatu titik (x, y) (satu)



$$m_{sec} = \frac{b-y}{a-x} = \frac{f(x+\Delta x) - f(x)}{(x+\Delta x) - x} = \frac{f(x+\Delta x) - f(x)}{\Delta x}$$

Kemiringan garis tangen (garis kemiringan kurva) bisa kita peroleh dgn mengambil a mendekati x, yaitu untuk Δx menuju nol.

$$\boxed{\therefore\ m_{tan} = \lim_{\Delta x \to 0} \frac{f(x+\Delta x) - f(x)}{\Delta x}}$$

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Depinisi :

Kemiringan kurva $y = f(x)$ diberikan oleh:

$$m = \lim_{\Delta x \to 0} \frac{f(x+\Delta x) - f(x)}{\Delta x}$$

Contoh :

1) Tentukan kemiringan kurva $y = x^2$ di titik $x = 3$, (yaitu di titik (3, 9))

Jawab :

Corat - coret
$f(x) = x^2$
$f(x+\Delta x) = (x+\Delta x)^2$

$$m = \lim_{\Delta x \to 0} \frac{f(x+\Delta x) - f(x)}{\Delta x}$$

$$= \lim_{\Delta x \to 0} \frac{(x+\Delta x)^2 - x^2}{\Delta x}$$

$$= \lim_{\Delta x \to 0} \frac{\cancel{x^2} + 2x \cdot \Delta x + \Delta x^2 - \cancel{x^2}}{\Delta x}$$

$$= \lim_{\Delta x \to 0} \frac{2x \cdot \Delta x + \Delta x^2}{\Delta x}$$

$$= \lim_{\Delta x \to 0} \frac{\cancel{\Delta x}(2x + \Delta x)}{\cancel{\Delta x}}$$

$\Rightarrow \boxed{m = 2x + 0 = 2x}$

$m \to 2x$ utk $\Delta x \to 0$

Jadi utk $x = 3$ diperoleh :

$$m\Big|_{x=3} = 2(3) = 6$$

Pers. garis kemiringan kurva di $x = 3$ adalah

$\{y = m(x - x_1) + y_1\} \Rightarrow y = 6(x-3) + 9 \Rightarrow y = 6x - 18 + 9$
$y = 6x - 9$

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Persamaan garis kemiringan kurva $y = f(x)$ di titik (x_1, y_1) diberikan oleh :

$$y = m(x - x_1) + y_1 \text{ , dengan } m = \lim_{\Delta x \to 0} \frac{f(x+\Delta x) - f(x)}{\Delta x}.$$

(untuk $x = x_1$) //

Definisi (Turunan Fungsi) :

1) Diberikan fungsi $y = f(x)$. Turunan fungsi $y = f(x)$, ditulis $f'(x)$, diberikan oleh :

$$f'(x) = \lim_{\Delta x \to 0} \frac{f(x+\Delta x) - f(x)}{\Delta x}$$ ✓

Jika limitnya ada.

2) Turunan fungsi $y = f(x)$ di titik $x = a$ diberikan oleh: $f'(a) = \lim_{\Delta x \to 0} \frac{f(a+\Delta x) - f(a)}{\Delta x}$, jika limitnya ada

3) Kalau diambil $x = a + \Delta x$, berarti $\Delta x = x - a$ diperoleh :

$$f'(x) = \lim_{\Delta x \to 0} \frac{f(x) - f(a)}{\Delta x}$$

$$= \lim_{x \to a} \frac{f(x) - f(a)}{x - a} \quad //$$

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1) Gunakan definisi turunan ~~f~~

$$f'(x) = \lim_{\Delta x \to 0} \frac{f(x+\Delta x) - f(x)}{\Delta x}$$ √

untuk menemukan turunan fungsi² berikut.

a) $f(x) = x^2 + 2x$

c) $f(x) = \frac{1}{x}$

b) $f(x) = x^3$

d) $f(x) = \sqrt{x}$

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