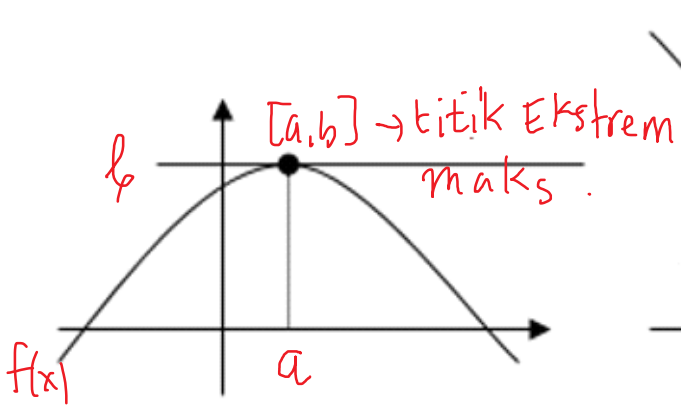
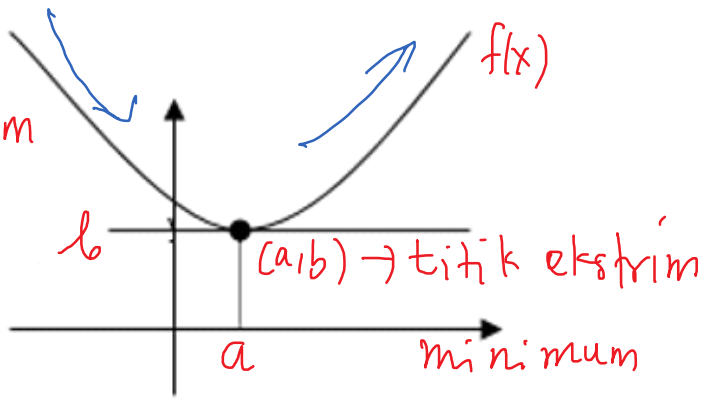
Nilai ekstrim [maksimum dan minimum]

28 September 2015 11:27





① di (a,b) terjadi perubahan dari monoton naik ke turun

di (a,b) terjadi perubahan dari monoton turun ke naik

1. $f(x) = x^2 - 5x + 6$
2. $f(x) = 5 + 12x - x^3$
3. $f(x) = 3x^4 - 4x^3$
4. $f(x) = x(x+2)^2$
5. $f(x) = (x^2 - 3)/(x^2 + 1)$
6. $f(x) = x^2/(1 + x^2)$

② diuji dg menggunakan turunan kedua

(a,b) t.e. maks ⇔ $f''(a) < 0$

(a,b) t.e. min ⇔ $f''(a) > 0$

$f'(x) = 2x - 5 \rightarrow f'(x) = 0 \Rightarrow x = 5/2$

− | + | +

monoton turun | $5/2$ | monoton naik

$5/2$ ↓ ekstrim minimum

titik ekstrem min

$x = 5/2 \rightarrow f(5/2) = (\frac{5}{2})^2 - 5 \cdot \frac{5}{2} + 6$

$= \frac{25}{4} - \frac{25}{2} + 6 = \frac{25}{4} - \frac{50}{4} + \frac{24}{4} = -\frac{1}{4}$

Jadi titik ekstrim (min) adalah $(5/2, -1/4)$

Cara 2 → $f''(x) = 2$

$x = 5/2 \rightarrow f''(5/2) = 2 > 0 \rightarrow$ minimum

Jadi $(5/2, -1/4)$ t.e. minimum.

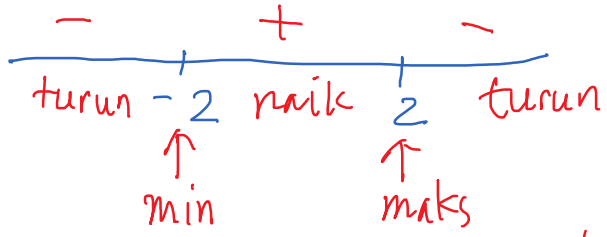
② $f(x) = 5 + 12x - x^3$ ✓

$f'(x) = 12 - 3x^2 \Rightarrow f'(x) = 0 \Rightarrow 12 - 3x^2 = 0$

$3(4 - x^2) = 0$

$3(2 - x)(2 + x) = 0$

$x = 2 \quad x = -2$



$x = -2 \rightarrow f(-2) = 5 + 12(-2) - (-2)^3 = 5 - 24 + 8 = -11$

jadi $(-2, -11)$ t.e. min

$x = 2 \rightarrow f(2) = 5 + 12(2) - 2^3 = 5 + 24 - 8 = 21$

jadi $(2, 21)$ t.e. maks //

$12 - 3x^2 = 0 \rightarrow 12 = 3x^2 \rightarrow 4 = x^2 \rightarrow x = 2$

$x = -2$

⑤ $f(x) = \dfrac{x^2 - 3}{x^2 + 1}$

$f'(x) = \dfrac{2x(x^2+1) - 2x(x^2-3)}{(x^2+1)^2} = \dfrac{2x^3 + 2x - 2x^3 + 6x}{(x^2+1)^2}$

$= \dfrac{8x}{(x^2+1)^2} \rightarrow f'(x) = 0 \rightarrow \dfrac{8x}{(x^2+1)^2} = 0$

$(x^2+1)^2 \neq 0$

$\rightarrow 8x = 0 \rightarrow x = 0$

↑min → $x = 0$ → $f(0) = -3$

Jadi t.e. min $(0, -3)$ //