No.

Date :

Tugas 9 Aplikasi Turunan

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1

$Y = x^4 - 4x^3$

$Y' = 4x^3 - 12x^2$

• Titik Stasioner $f'(x) = 0$

$Y' = 4x^3 - 12x^2$

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

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

$x = 0 \quad , \quad x = 3$

$f(0) = 0$

$f(3) = -27$

• titik potong

$Y = 0 \rightarrow x = 0, x = 4$

$x = 0 \rightarrow Y = 0$

$- \quad\quad - \quad\quad +$ (0, 3)

$x = 0$, tdk trjd perub nilai

$x = 3$, dari (-) ke (+) nilai min

- monoton naik pd selang $(3, \infty)$
- monoton turun pd selang $(-\infty, 3)$

• Selang kecekungan $f''(x) = 0$

$Y' = 4x^3 - 12x^2$

$Y'' = 12x^2 - 24x$

$12x(x-2) = 0$

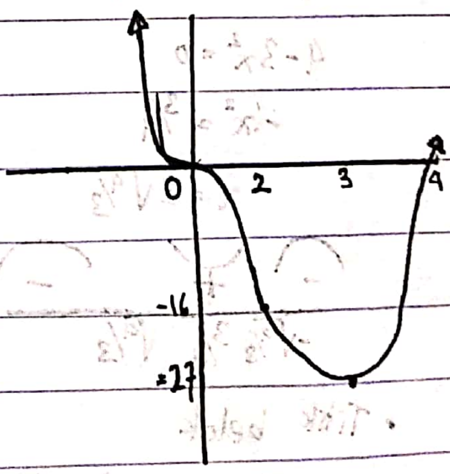
$x = 0 \quad , \quad x = 2$

$+ \quad\quad - \quad\quad +$ (0, 2)

cekung ke atas pd $(\infty, 0) \cup (2, \infty)$

cekung ke bawah pd $(0, 2)$

• Grafik



• Titik belok

$f(0) = 0$

$f(2) = -16$

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2

$y = 2x^2 - \frac{1}{4}x^4$

• Titik Stationer

$y' = 4x - x^3$

$4x - x^3 = 0$

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

$x = 0 \lor x = 2,\ x = -2$

$$\begin{array}{cccc} \nearrow & \searrow & \nearrow & \searrow \\ + & - & + & - \end{array}$$
$$\overline{\quad -2 \quad\quad 0 \quad\quad 2 \quad}$$

$f(-2) = 4 \rightarrow$ nilai max

$f(0) = 0 \rightarrow$ nilai min

$f(2) = 4 \rightarrow$ nilai max

- monoton naik pd $(\infty, -2) \cup (0, 2)$
- monoton turun pd $(-2, 0) \cup (2, \infty)$

• Selang kecekungan

$y' = 4x - x^3$

$y'' = 4 - 3x^2$

$4 - 3x^2 = 0$

$-3x^2 = -4$

$x = \pm\sqrt{4/3}$

$$\begin{array}{ccc} \frown & \smile & \frown \\ - & + & - \end{array}$$
$$\overline{\quad -\sqrt{4/3} \quad\quad \sqrt{4/3} \quad}$$

• Titik belok

$f(-\sqrt{4/3}) = 2 \cdot 4/3 - \left(\frac{1}{4}\right)\left(\frac{16}{9}\right) = \frac{20}{9}$

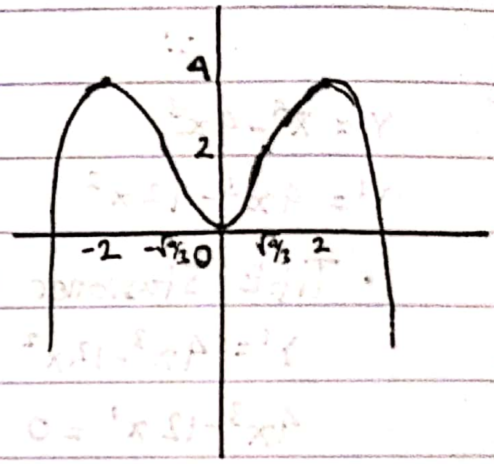
$f(\sqrt{4/3}) = 2 \cdot 4/3 - \left(\frac{1}{4}\right)\left(\frac{16}{9}\right) = \frac{20}{9}$

• titik potong

$y = 0 \rightarrow x = 0$

$x = 0 \rightarrow y = 0$

• Grafik



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3

$$Y = \frac{x^2-2x+1}{x-2}$$

• titik potong

$y=0 \rightarrow x=1$

$x=0 \rightarrow y=-\frac{1}{2}$

• Titik Stationer

$$Y = \frac{(x-1)^2}{x-2}$$

$$y' = \frac{2(x-1).(x-2)-(x-1)^2.1}{(x-2)^2}$$

$$= \frac{x^2-4x+3}{(x-2)^2}$$

$$= \frac{(x-3)(x-1)}{(x-2)^2}$$

$x=3$, $x=1$, $x \neq 2$

$+$ $-$ $-$ $+$

1 2 3

$f(1) = 0 \rightarrow$ nilai max

$f(3) = 4 \rightarrow$ nilai min

- monoton naik pd $(-\infty,1) \cup (3,\infty)$
- monoton turun pd $(1,2) \cup (2,3)$

• Selang kecekungan

$$y' = \frac{x^2-4x+3}{(x-2)^2}$$

$$y'' = \frac{(2x-4)(x-2)^2-(x^2-4x+3)2(x-2).1}{(x-2)^4}$$

$$0 = \frac{2(x-2)}{(x-2)^4}$$

$$0 = \frac{2}{(x-2)^3}$$

$x = 2$

$-$ $+$

2

• titik belok

$$f(2) = \frac{4-4+1}{2-2} = \infty$$

• Asimtot

- Asimtot tegak

$$\frac{x^2-2x+1}{(x-2)} \Rightarrow x-2=0$$

$x=2$

- Asimtot miring

$Y = ax+b$

$$\lim_{x\to\pm\infty} \frac{\left(\frac{x^2-2x+1}{x-2}\right)}{x} = a$$

$$\lim_{x\to\pm\infty} \frac{x^2-2x+1}{x^2-2x} = 1 = a$$

$$\lim_{x\to\pm\infty} \left(\frac{x^2-2x+1}{x-2}\right) - x = b$$

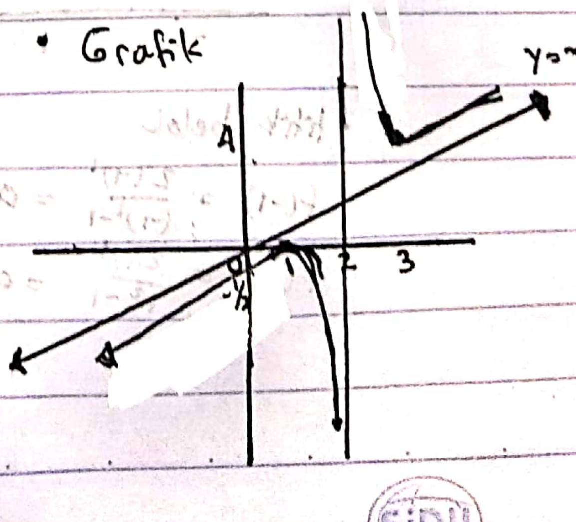
$$\lim_{x\to\pm\infty} \frac{x^2-2x+1}{x-2} - \frac{x^2-2x}{x-2}$$

$$\lim_{x\to\pm\infty} \frac{1}{x-2} = 0$$

$\therefore$ Asimtot miring $\Rightarrow y = 1x+0$

$y = x$

• Grafik



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4

$Y = \frac{2x^2}{x^2-1}$

• Titik stationer

$Y' = \frac{4x(x^2-1) - 2x^2(2x)}{(x^2-1)^2}$

$0 = \frac{(4x^3 - 4x) - 4x^3}{(x^2-1)^2}$

$0 = \frac{-4x}{(x^2-1)^2}$

$x = 0 \;, \; x \neq 1 \;, \; x \neq -1$

$+ \quad + \quad - \quad -$

$-1 \quad 0 \quad 1$

$f(0) = 0 \rightarrow$ nilai max

- monoton naik pd $(-\infty, 0)$
- monoton turun pd $(0, \infty)$

• Selang kecekungan

$Y' = \frac{-4x}{(x^2-1)^2}$

$Y'' = \frac{-4(x^2-1)^2 \cdot 1) - (-4x)(2(x^2-1) \cdot 2x)}{(x^2-1)^4}$

$Y'' = \frac{12x^4 - 8x^2 - 4}{(x^2-1)^4} = 0$

$x = 1 \;, \; x = -1$

$+ \quad - \quad +$

$-1 \quad 1$

• titik belok

$f(-1) = \frac{2(-1)^2}{(-1)^2 - 1} = \infty$

$f(1) = \frac{2(1)^2}{1^2 - 1} = \infty$

• Asimtot

- tegak

$Y = \frac{2x^2}{x^2-1} \rightarrow x^2 - 1 = 0$

$x^2 = 1$

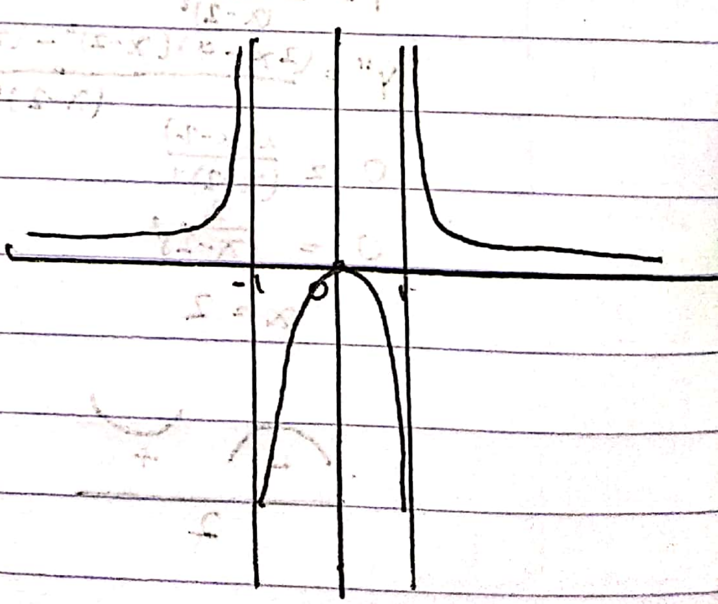
$x = \pm 1 \rightarrow$ Asimtot tegak

- Datar

$Y = \frac{2x^2}{x^2-1}$

$\therefore$ Asimtot datar $= \frac{2}{1} = 2$

• Grafik



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