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Prodi : Teknologi Informasi

Kelompok : B-5

## Tugas Tutor KUT 1

1. Carilah daerah asal dan ~~hasil~~ hasil dari:

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

Daerah asal  $\rightarrow x - 1 \neq 0$

$$x \neq 1$$

$$\rightarrow D_f = \{x | x \neq 1\}$$

Daerah hasil  $\rightarrow f(x) = \frac{x^3 + x^2 - x - 1}{x - 1}$

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

$$= x + 1$$

$$f(x) = x^2 + 2x + 1$$

$$m = 0 \rightarrow 0 = \frac{d f(x)}{d x}$$

$$0 = 2x + 2$$

$$-2 = 2x$$

$$f(-1) = (-1)^2 + 2(-1) + 1$$

$$= 1 - 2 + 1$$

$$= 0$$

$$\rightarrow R_f = \{y | y \geq 0\}$$

b)  $y = \sqrt{9 - x^2}$

Daerah asal  $\rightarrow 9 - x^2 \geq 0$

$$9 \geq x^2$$

$$x_1 = 3$$

$$x_2 = -3$$



$$D_f = \{x | -3 \leq x \leq 3\}$$

Daerah hasil  $\rightarrow \min \Rightarrow y = \sqrt{9 - 3^2}$

$$y = \sqrt{0} \Rightarrow y = 0$$

$$\max \Rightarrow y = \sqrt{9 - 0^2}$$

$$y = \sqrt{9}$$

$$y = 3$$

$$R_f = \{y | 0 \leq y \leq 3\}$$

2. Tentukan hasil dan tentukan apakah kontinu atau tidak

a)  $\lim_{x \rightarrow \infty} \left( \frac{x^5 + x^3 + 2}{x^5 + x^2 + x + 1} \right) = \lim_{x \rightarrow \infty} \frac{x^5/x^5 + x^3/x^5 + 2/x^5}{x^5/x^5 + x^2/x^5 + x/x^5 + 1/x^5}$

$$= \lim_{x \rightarrow \infty} \frac{1 + 1/x^2 + 2/x^5}{1 + 1/x^3 + 1/x^4 + 1/x^5}$$

$$= \frac{1}{1} = 1$$

$x^5 + x^2 + x + 1 \neq 0 \Rightarrow$  Tidak kontinu karena pada daerah  $x$  di  $x^5 + x^2 + x + 1$  terdapat gap.

$$b). \lim_{x \rightarrow 0} \left( \frac{x^8 + x^5 + x^2 + 2}{x^5 + x^3 + x + 1} \right) = \frac{0 + 0 + 0 + 2}{0 + 0 + 0 + 1} = \frac{2}{1} = 2$$

$x^5 + x^3 + x + 1 \neq 0 \Rightarrow$  Tidak kontinu karena di  $x$  pada  $x^5 + x^3 + x + 1$  terdapat gap.

$$c). \lim_{x \rightarrow \infty} \left( \frac{x^{100} + x^{99} + \dots + x + 1}{x^{100} + x^{99} + \dots + x^2 + 1} + 1 \right) = 1 + \lim_{x \rightarrow \infty} \left( \frac{x^{100}/x^{100} + x^{99}/x^{100} + \dots + 1/x^{100}}{x^{100}/x^{100} + x^{99}/x^{100} + \dots + 1/x^{100}} \right)$$

$$= 1 + \lim_{x \rightarrow \infty} \left( \frac{1 + 1/x + \dots + 1/x^{100}}{1 + 1/x^2 + \dots + 1/x^{100}} \right)$$

$$= 1 + \frac{1}{1} = 2$$

Fungsi tidak kontinu karena pada  $x$  pada akar  $x^{100} + x^{99} + \dots + x^2 + 1$  terdapat gap.

$$d). \lim_{n \rightarrow 0} (\sin(n) + \cos(n)) = \sin 0 + \cos 0 = 0 + 1 = 1$$

Fungsi kontinu karena tidak terputus.

$$e). \lim_{n \rightarrow 0} \left( \frac{\cos(n)}{n} + 1 \right) = 1 + \lim_{n \rightarrow 0} \left( \frac{\cos(n)}{n} \right)$$

$$= 1 + \lim_{n \rightarrow 0} \left( \frac{-\sin(n)}{1} \right) \quad (\text{l'Hopital})$$

$$= 1 + \frac{0}{1} = 1$$

Fungsi tidak kontinu karena pada  $n=0$ , fungsi tidak terdefinisi atau fungsi tidak menyentuh  $n=0$ .

$$f). \lim_{n \rightarrow 0} \left( \frac{\sin^2(n)}{n} \right) = \lim_{n \rightarrow 0} \frac{2\sin(n)\cos(n)}{1} \quad (\text{l'Hopital})$$

$$= 2 \cdot 0 \cdot 1 = 0$$

Fungsi tidak kontinu karena  $n \neq 0$ .

$$g). \lim_{n \rightarrow \infty} \left( \frac{n - \cos(n)}{n} \right) = \lim_{n \rightarrow \infty} \left( \frac{n/n - \cos(n)/n}{n/n} \right)$$

$$= \lim_{n \rightarrow \infty} \left( \frac{1 - \cos(n)/n}{1} \right) = 1$$

Fungsi tidak kontinu karena  $n \neq 0$ .



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$$\begin{aligned} \text{h)} \quad \lim_{n \rightarrow 0} \left( \sin(2n) \cdot \frac{1}{n^3} \right) &= \lim_{n \rightarrow 0} \left( \frac{\sin(2n)}{n^3} \right) = \lim_{n \rightarrow 0} \left( \frac{2 \cos(2n)}{3n^2} \right) = \lim_{n \rightarrow 0} \left( \frac{-4 \sin(2n)}{6n} \right) \\ &= \lim_{n \rightarrow 0} \left( \frac{-8 \cos(2n)}{6} \right) = \frac{-8}{6} = \frac{-4}{3} \end{aligned}$$

Fungsi tidak kontinu karena pada  $n^3 \neq 0$ ,  $n \neq 0$ .

3. Buatlah persamaan garis yang menyinggung.

a)  $y = x^2 + 5x + b$ ,  $x_1 = 0$

$$m = f'(x)$$

$$m = 2x + 5$$

$$m = 2 \cdot 0 + 5$$

$$m = 5$$

$$y_1 = x^2 + 5x + b$$

$$y_1 = 0^2 + 5 \cdot 0 + b$$

$$y_1 = b$$

$$y - y_1 = m(x - x_1)$$

$$y - b = 5(x - 0)$$

$$y - b = 5x$$

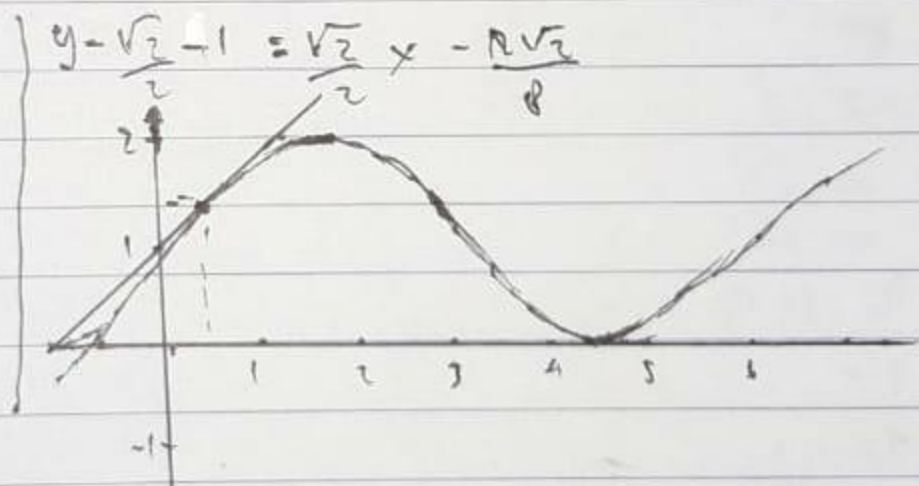
$$y = 5x + b$$

b)  $y = \sin(x) + 1$ ,  $x = \frac{\pi}{4}$

$$y = \sin\left(\frac{\pi}{4}\right) + 1$$

$$y = \frac{\sqrt{2}}{2} + 1$$

$$m = \frac{d}{dx} \sin(x) + 1 \Big|_{x=\frac{\pi}{4}} = \frac{\sqrt{2}}{2}$$



4. a)  $F(x) = \ln(\sin(x))$ ,  $F'(x) = ?$

$$F'(x) = \frac{d}{dx} \ln(\sin(x))$$

$$F'(x) = \frac{1}{\sin(x)} \cdot \cos(x)$$

$$F'(x) = \frac{\cos(x)}{\sin(x)} = \cot(x)$$