NAMA :FAIZ HIDAYAT

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KELAS :IF1A

MID KALKULUS

1. SELESAIKANLAH;

1a. $\frac{2x-1}{x-3} > 3$

$$\frac{2x-1}{x-3} > 3$$

$$\frac{2x-1}{x-3} - 3 > 0$$

$$\frac{2x-1}{x-3} - \frac{3(x-3)}{x-3} > 0$$

$$\frac{2x-1-3x+9}{x-3} > 0$$

$$\frac{-x+8}{x-3} > 0$$

$$-x+8 > 0$$

$$x-8 < 0$$

$$x < 8$$

$$x-3 > 0$$

$$x > 3$$

jadi, himpuan penyelesaiannya adalah $\{3 < x < 8\}$

1b. $\left|2+\frac{5}{x}\right| > 1$

$2+\frac{5}{x} > 1$ *atau* $2+\frac{5}{x} < -1$

$2+\frac{5}{x}-1 > 0$ *atau* $2+\frac{5}{x}+1 < 0$

$1+\frac{5}{x} > 0$ *atau* $3+\frac{5}{x} < 0$

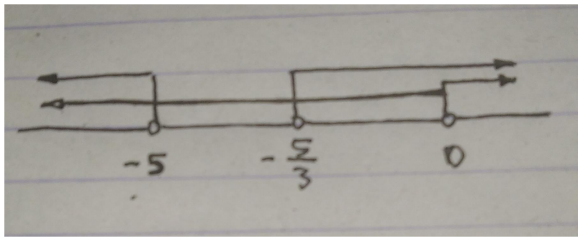
$\frac{x}{x}+\frac{5}{x} > 0$ *atau* $\frac{3x}{x}+\frac{5}{X} < 0$

$\frac{x+5}{x} > 0$ $\qquad$ $\frac{3x+5}{x} < 0$

$x+5=0$ $\qquad$ $3x+5=0$

$x_1 = -5$ $\qquad$ $x_3 = -\frac{5}{3}$

$x_2 = 0$ $\qquad$ $x_4 = 0$



$Hp = \left\{x \middle| x < - \quad atau - \frac{5}{3} < x < 0 \; atau \; x > 0\right\}$

2. TENTUKAN NILAI LIMIT

2a. $\lim_{x\to -1} \frac{x^3 - 6x^2 + 11x - 6}{x^3 + 4x^2 - 19x + 14}$

$$\lim_{x\to -1} \frac{x^3 - 6x^2 + 11x -}{x^3 + 4x^2 - 19x +} = \frac{(-1)^3 - 6(-1)^2 + 1\ \ (-1) - 6}{(-1)^3 + 4(-1)^2 - 19(-1) + 14}$$

$$= \frac{-1 - 6 - 11 - 6}{-1 + 4 + 19 + 1}$$

$$= -\frac{24}{36}$$

$$= -\frac{2}{3}$$

2b. $\lim_{x\to 1} \frac{x^2 + x - 2}{x^2 - 1}$

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

$$= \lim_{x\to 1} \frac{x+2}{x+1}$$

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

$$= \frac{3}{2}$$

2c. $\lim_{x\to 0} \frac{\sqrt{x+2} + \sqrt{2}}{x}$

$$\lim_{x\to 0}\frac{\sqrt{x+2}+\sqrt{2}}{x}=\frac{\sqrt{0+2}+\sqrt{2}}{0}$$

$$=\frac{\sqrt{2}+\sqrt{2}}{0}$$

$$=\infty$$

3. tentukan persamaan garis singgung pada kurva berikut pada titik yang diberikan;

$$y=1-2x-3x^2\ di\ titik\ (-2,-7)$$

$$f(x)=1-2x-3x^2$$

$$f(-2)=1-2(-2)-3(-2)^2$$

$$=1+4-12$$

$$=-7$$

$$f(x+h)=1-2(x+h)-3(x+h)^2$$

$$f(-2+h)=1-2(-2+h)-3(-2+h)^2$$

$$=1+4-2h-3(4-4h+h^2)$$

$$=5-2h-12+12h-3h^2$$

$$=-7+10h-3h^2$$

$$m=f'(x)=\lim_{h\to 0}\frac{f(x+h)-f(x)}{h}=\lim_{h\to 0}\frac{f(-7+10h-3h^2)-f(-7)}{h}$$

$$=\lim_{h\to 0}\frac{-7+10h-3h^2+7}{h}$$

$$=\lim_{h\to 0}\frac{-7+7+h(10-3h)}{h}$$

$$=\lim_{h\to 0}10-3h$$

$$=10-3(0)$$

$$=10$$

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

$$y+7=10(x+2)$$

$$y=10x+20-7$$

$$y = 10x + 13$$

4. carilah turunan kedua untuk fungsi-fungsi implisit dibawah ini;

$4a. 3x^3 + 3x^2y - 8xy^2 + 2y^3 = 0$

$$\frac{d}{dx}(3x^3) + \frac{d}{dx}(3x^2y) - \frac{d}{dx}8xy^2 + \frac{d}{dx}2y^3 = 0$$

$$9x^2 + \frac{d}{dx}(3x^2)y + 3x^2\frac{d}{dy}(y)\frac{dy}{dx} - \left(\frac{d}{dx}(8x)y^2 + 8x\frac{d}{dy}(y^2)\frac{dy}{dx}\right) + \frac{d}{dy}(2y^3)\frac{dy}{dx} = 0$$

$$9x^2 + 6xy + 3x^2\frac{dy}{dx} - 8y^2 - 16xy\frac{dy}{dx} + 6y^2\frac{dy}{dx} = 0$$

$$3x^2\frac{dy}{dx} - 16xy\frac{dy}{dx} + 6y^2\frac{dy}{dx} = -9x^2 - 6xy + 8y^2$$

$$\frac{dy}{dx}(3x^2 - 16xy + 6y^2) = -9x^2 - 6xy + 8y^2$$

$$\frac{dy}{dx} = \frac{-9x^2 - 6xy + 8y^2}{3x^2 - 16xy + 6y^2}$$

$4b. xy + y^3 = 2$

Turunan pertama

$$xy + y^3 = 2$$

$$\frac{d}{dx}(xy) + \frac{d}{dx}(y^3) = \frac{d}{dx}2$$

$$\frac{d}{dx}(x)y + x\frac{d}{dy}(y)\frac{dy}{dx} + \frac{d}{dy}(y^3)\frac{dy}{dx} = 0$$

$$y + x\frac{dy}{dx} + 3y^2\frac{dy}{dx} = 0$$

$$\frac{dy}{dx}(x + 3y^2) = -y$$

$$\frac{dy}{dx} = -\frac{y}{x + 3y^2}$$

Turunan kedua

$$\frac{dy}{dx}\left(\frac{d}{dx}\right) = -\frac{d}{dx}\left(\frac{y}{x + 3y^2}\right)$$

$$\frac{d^2y}{dx^2} = -\frac{d}{dx}\left(\frac{f}{g}\right)$$

$$= -\frac{\frac{d}{dx}(f)g - f\frac{d}{dx}(g)}{g^2}$$

$$= -\frac{\frac{d}{dx}(y)x + 3y^2 - y\frac{d}{dx}(x + 3y^2)}{(x + 3y^2)^2}$$

$$= -\frac{\frac{d}{dy}(y)\frac{dy}{dx}x + 3y^2 - y\left(\frac{d}{dx}(x) + \frac{d}{dy}(3y^2)\frac{dy}{dx}\right)}{(x + 3y^2)^2}$$

$$= -\frac{\frac{dy}{dx}x + 3y^2 - y\left(1 + 6y\frac{dy}{dx}\right)}{(x + 3y^2)^2}$$

$$= -\frac{\frac{dy}{dx}x + 3y^2 - y - 6y^2\frac{dy}{dx}}{(x + 3y^2)^2}$$

$$= -\frac{\frac{dy}{dx}x - 3y^2\frac{dy}{dx} - y}{(x + 3y^2)^2}$$

$$= -\frac{\left(-\frac{y}{x + 3y^2}\right)x - 3y^2\left(-\frac{y}{x + 3y^2}\right) - y}{(x + 3y^2)^2}$$

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

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

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

$$= \frac{2xy}{(x + 3y^2)(x + 3y^2)^2}$$

$$= \frac{2xy}{(x + 3y^2)^3}$$