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

ZAČETNA VREDNOST

$f(0) = \frac{0+1}{0-1} = -1 \qquad N(0,-1)$

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

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

$k_T = \frac{-2 \cdot 0 - 2 \cdot 0 - 2}{(0-1)^2} = \frac{-2}{1} = -2$

$y+1 = -2(x-0)$

$\underline{\underline{y = -2x-1}}$

12. $y = 5x^{-1}$

$\underline{T(-1, y_0)}$

1\. TOČKA: $T(-1, y_0)$

$y_0 = 5 \cdot (-1)^{-1}$

$y_0 = -5$

$T(-1,-5)$

2\. ODVOD:

$y' = 5 \cdot (-1) x^{-2}$

$y' = -5x^2$

$y' = k_T$ VSTAVIŠ $x=-1$

$k_T = -5(-1)^2$

$k_T = -5$

$\Downarrow$

$k_N = \frac{1}{5}$

3\. ENAČBA NORMALE: $y+5 = \frac{1}{5}(x+1)$

$y = \frac{1}{5}x + \frac{1}{5} - 5$

$\underline{\underline{y = \frac{1}{5}x - \frac{24}{6}}}$

b) $g(x) = (2x-3)^2 \cdot (x^2+1)$

$g(x) = (4x^2-12x+9)\cdot(x^2+1) = 4x^4-12x^3+9x^2+4x^2-12x+9 = 4x^4-12x^3+13x^2-12x+9$

$g'(x) = 4\cdot 4x^3 - 12\cdot 3x^2 + 13\cdot 2x - 12$

$g'(x) = 16x^3-36x^2+26x-12$

c) $h(x) = (4x^2+3)\cdot(1-x)^{-1}$ $\qquad \left(\frac{f}{g}\right)' = \frac{f'\cdot g - f\cdot g'}{g^2}$

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

$h'(x) = \frac{(4x^2+3)'\cdot(1-x) - (4x^2+3)\cdot(1-x)'}{(1-x)^2} = \frac{8x\cdot(1-x) - (4x^2+3)\cdot(-1)}{(1-x)^2} = \frac{8x-8x^2+4x^2+3}{(1-x)^2} = \frac{-4x^2+8x+3}{(1-x)^2}$

10. $r(x) = ax^5-4x^3+7x^2+bx+25 \longrightarrow r'(x) = 5ax^4-12x^2+14x+b$

$r(-2) = 5$

$r'(-1) = -8$

$r(-2) = a(-2)^5-4\cdot(-2)^3+7\cdot(-2)^2-2b+25$

$5 = -32a+32+28-2b+25$

$-80 = -32a-2b$

$r'(-1) = 5a\cdot(-1)^4-12\cdot(-1)^2+14\cdot(-1)+b$

$-8 = 5a-12-14+b$

$18 = 5a+b$

$-80 = -32a-2b$

$18 = 5a+b \quad /\cdot 2$

$-80 = -32a-2b$

$36 = 10a+2b$

$-44 = -22a$ $\qquad 18 = 10+b$

$a = 2$ $\qquad b = 8$

7. $\frac{x}{4} - \frac{y}{2} = 1 \longrightarrow y = \frac{1}{2}x - 2$ $\quad k_1 = \frac{1}{2}$

$f(x) = \frac{3x+4}{2x-3} + 2\frac{1}{3}$

ZAČETNA TOČKA:

$f(0) = \frac{3\cdot 0+4}{2\cdot 0-3} + 2\frac{1}{3} = \frac{4}{-3} + \frac{7}{3} = 1$

$N(0,1)$

VZPOREDNICA $k_1 = k_2$

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

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

PRAVOKOTNICA $k_2 = -2$

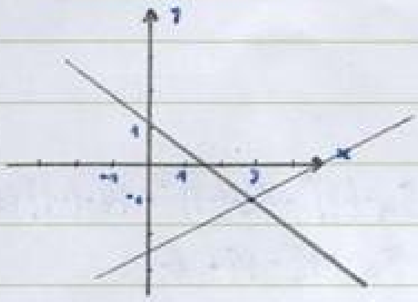
$y - 1 = -2(x-0)$

$y = -2x + 1$

8. $\alpha = 45°$

$2x + y - 5 = 0$

$3x + 5y - 4 = 0$



$2x + y - 5 = 0 \quad /\cdot(-5)$

$3x + 5y - 4 = 0$

$-10x - 5y + 25 = 0$

$3x + 5y - 4 = 0$

$-7x = -21$

$x = 3$

$6 + y - 5 = 0$

$y = -1$

$T(3,-1)$

$k = -1 \qquad y + 1 = -1(x-3)$

$y = -x + 3 - 1$

$y = -x + 2$

9. a) $f(x) = \frac{4x^3}{3} + \frac{x^2}{2} + 5x - 3 + \frac{2}{x} - \frac{5}{2x^2}$

$f(x) = \frac{4}{3}x^3 + \frac{1}{2}x^2 + 5x - 3 + 2x^{-1} - \frac{5}{2}x^{-2}$

$f'(x) = \frac{4}{3}\cdot 3x^2 + \frac{1}{2}\cdot 2x + 5 - 0 + 2\cdot(-1)x^{-2} - \frac{5}{2}\cdot(-2)x^{-3}$

$f'(x) = 4x^2 + x + 5 - 2x^{-2} + 5x^{-3}$

1. $f(x) = -x+3$

$g(x) = 2x+1$

a) $g(3x-2) = 2f(x)+11$

$2(3x-2)+1 = 2(-x+3)+11$

$6x-4+1 = -2x+6+11$

$8x = 20 \quad /:8$

$x = \frac{20}{8}$

$x = \frac{5}{2}$

b) $(g \circ f)(x) = 2(-x+3)+1 = -2x+6+1 = -2x+7$

$(f \circ g)(x) = -(2x+1)+3 = -2x-1+3 = -2x+2$

$(g \circ g)(x) = 2(2x+1)+1 = 4x+2+1 = 4x+3$

2. a) $\lim\limits_{x\to 1}\left(\frac{6}{1-x} - \frac{5+7x}{1-x^2}\right) = \lim\limits_{x\to 1}\left(\frac{6(1-x^2)}{(1-x)(1-x^2)} - \frac{(5+7x)(1-x)}{(1-x)(1-x^2)}\right) = \lim\limits_{x\to 1}\left(\frac{6-6x^2-5-7x+5x+7x^2}{(1-x)(1-x^2)}\right) =$

$= \lim\limits_{x\to 1}\left(\frac{x^2-2x+1}{(1-x)(1-x^2)}\right) = \lim\limits_{x\to 1}\left(\frac{\cancel{(x-1)}\cancel{(x-1)}\,1}{\cancel{(x-1)}\cancel{(x-1)}(x+1)}\right) = \lim\limits_{x\to 1}\left(\frac{1}{x+1}\right) = \frac{1}{2}$

b) $\lim\limits_{x\to\infty}\frac{x^4+2x^2-24}{2x^4+8x^3-24x^2} \; /:x^4 = \lim\limits_{x\to\infty}\frac{\frac{x^4}{x^4}+\frac{2x^2}{x^4}-\frac{24}{x^4}}{\frac{2x^4}{x^4}+\frac{8x^3}{x^4}-\frac{24x^2}{x^4}} = \lim\limits_{x\to\infty}\frac{1+\frac{2}{x^2}-\frac{24}{x^4}}{2+\frac{8}{x}-\frac{24}{x^2}} = \frac{1}{2}$

3. $2x-5y-10=0 \longrightarrow y = \frac{2}{5}x-2$ $\quad k = \frac{2}{5}$

$k_2 = -\frac{5}{2}$

NIČLA:

$0 = \frac{2}{5}x - 2$

$2 = \frac{2}{5}x \quad /:\frac{2}{5}$

$x = 5$

$(5,0) \longrightarrow y+0 = -\frac{5}{2}(x-5)$

$y = -\frac{5}{2}x + \frac{25}{2}$

ZAČETNA TOČKA:

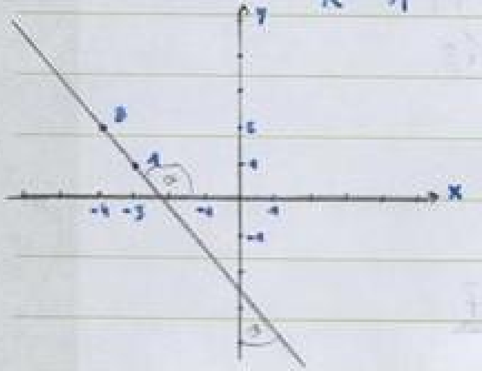
$N(0,-2) \longrightarrow y+2 = -\frac{5}{2}(x-0)$

$y = -\frac{5}{2}x - 2$

4. $A(-3,1)$ $\quad k = \frac{2-1}{-4+3}$ $\quad \tan\alpha = k$

$B(-4,2)$ $\quad k = \frac{1}{-1}$ $\quad \tan\alpha = -1$

$k = -1$ $\quad \alpha = 135°$ $\quad -45° + 180°$



$\beta = 180° - 135°$

$\beta = 45°$

5. $x - y - 7 = 0 \longrightarrow y = x - 7 \quad k_1 = 1$

$y + (2-\sqrt{3})x - 5 = 0 \longrightarrow y = -(2-\sqrt{3})x + 5 \quad k_2 = -(2-\sqrt{3})$

$$\tan\alpha = \left|\frac{k_2 - k_1}{1 + k_1 \cdot k_2}\right| = \left|\frac{-2+\sqrt{3}-1}{1+(-2+\sqrt{3})\cdot 1}\right| = \left|\frac{-3+\sqrt{3}}{1+(-2+\sqrt{3})}\right| = \left|\frac{-3+\sqrt{3}}{-1+\sqrt{3}}\right| \cdot (-1-\sqrt{3}) = \left|\frac{(-3+\sqrt{3})(-1-\sqrt{3})}{(-1+\sqrt{3})(-1-\sqrt{3})}\right| = \left|\frac{3+3\sqrt{3}-\sqrt{3}-3}{1+\sqrt{3}-\sqrt{3}-3}\right| =$$

$$= \left|\frac{2\sqrt{3}}{-2}\right| = \frac{2\sqrt{3}}{2}$$

$\alpha = 60°$

6. $A(-2,3)$ $\quad y + 1 = -\frac{1}{4}(x+1)$

$B(3,-2)$ $\quad k_1 = \frac{-1+2}{-1-3}$ $\quad y = -\frac{1}{4}x - \frac{1}{4} -$

$C(-1,-1)$ $\quad k_1 = \frac{1}{-4}$ $\quad y = -\frac{1}{4}x - \frac{5}{4}$

$k_T = -\frac{1}{4}$

$k_N = 4$

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

$y = 4x + 8 + 3$

$y = 4x + 11$