CVIČENÍ 1

1.1

1. $m = 3$
2. $m = 4$

1.2

1. $d + e = (1,0,-2,0) + (3,0,1,3) = (4,0,-1,3)$
2. $2c - d = 2(1,2,1,1) - (1,0,-2,0) = (2,4,2,2) + (-1,0,2,0) = (1,4,4,2)$
3. $b - f + 3e = (-1,0,1) - (-1,1,0,-2) + 3(3,0,1,3)$ ... nejde
4. $3f - (4d - c) = 3(-1,1,0,-2) - (4(1,0,-2,0) - (1,2,1,1)) =$

$$= (-3,3,0,-6) - ((4,0,-8,0) + (-1,-2,-1,-1)) =$$
$$= (-3,3,0,-6) - (3,-2,-9,-1) =$$
$$= (-3,3,0,-6) + (-3,2,9,1) = (-6,5,9,-5)$$

1.3

1. $3e \times c = 3(3,0,1,3) \times (1,2,1,1) = (9,0,3,9) \times (1,2,1,1) = 9\cdot 1 + 0\cdot 2 + 3\cdot 1 + 9\cdot 1 = 21$
2. $a \times b - 8d \times f = (2,1,2) \times (-1,0,1) - 8(1,0,-2,0) \times (-1,1,0,-2) =$

$$= 2\cdot(-1) + 1\cdot 0 + 2\cdot 1 - 8(1\cdot(-1) + 0\cdot 1 - 2\cdot 0 + 0\cdot(-2)) =$$
$$= -2 + 2 - 8(-1) = 8$$

1.4

1. $D^T = \begin{pmatrix} 2 & -1 \\ 0 & 2 \\ -1 & 3 \end{pmatrix}^T = \begin{pmatrix} 2 & 0 & -1 \\ -1 & 2 & 3 \end{pmatrix}$
2. $F^T = \begin{pmatrix} 1 & 3 & 2 \\ -1 & 2 & 0 \\ 0 & 1 & 2 \end{pmatrix}^T = \begin{pmatrix} 1 & -1 & 0 \\ 3 & 2 & 1 \\ 2 & 0 & 2 \end{pmatrix}$

1.5

1. $\dim(C) = \dim\begin{pmatrix} 1 & 3 & 0 \\ -1 & 0 & -2 \end{pmatrix} = 2\times 3$
2. $\dim D^T \times C^T = \dim((D_{3\times 2})^T \times (C_{2\times 3})^T) = 2\times 3 \times 3\times 2 = 2\times 2$
3. $\dim(E \times F) = \dim(E_{2\times 2} \times F_{3\times 3}) =$ nejde

1.6

1. $B - 2E = \begin{pmatrix} -1 \\ 0 \\ 1 \end{pmatrix} - 2\begin{pmatrix} -2 & 0 \\ 0 & -2 \end{pmatrix} =$ nejde

2. $3D^T + 2C = 3\begin{pmatrix} 2 & -1 \\ 0 & 2 \\ -1 & 3 \end{pmatrix}^T + 2\begin{pmatrix} 1 & 3 & 0 \\ -1 & 0 & -2 \end{pmatrix} = 3\begin{pmatrix} 2 & 0 & -1 \\ -1 & 2 & 3 \end{pmatrix} + 2\begin{pmatrix} 1 & 3 & 0 \\ -1 & 0 & -2 \end{pmatrix} =$

$= \begin{pmatrix} 6 & 0 & -3 \\ -3 & 6 & 9 \end{pmatrix} + \begin{pmatrix} 2 & 6 & 0 \\ -2 & 0 & -4 \end{pmatrix} = \begin{pmatrix} 8 & 6 & -3 \\ -5 & 6 & 5 \end{pmatrix}$

1.7

1. $D^T \times C^T = \begin{pmatrix} 2 & -1 \\ 0 & 2 \\ -1 & 3 \end{pmatrix}^T \times \begin{pmatrix} 1 & 3 & 0 \\ -1 & 0 & -2 \end{pmatrix}^T = \begin{pmatrix} 2 & 0 & -1 \\ -1 & 2 & 3 \end{pmatrix} \times \begin{pmatrix} 1 & -1 \\ 3 & 0 \\ 0 & -2 \end{pmatrix} = \begin{pmatrix} 2 & 0 \\ 5 & -5 \end{pmatrix}$

2. $C \times F + 2D^T = \begin{pmatrix} 1 & 3 & 0 \\ -1 & 0 & -2 \end{pmatrix} \times \begin{pmatrix} 1 & 3 & 2 \\ -1 & 2 & 0 \\ 0 & 1 & 2 \end{pmatrix} + 2\begin{pmatrix} 2 & -1 \\ 0 & 2 \\ -1 & 3 \end{pmatrix}^T$

$= \begin{pmatrix} -2 & 9 & 2 \\ -1 & -5 & -6 \end{pmatrix} + 2\begin{pmatrix} 2 & 0 & -1 \\ -1 & 2 & 3 \end{pmatrix} = \begin{pmatrix} -2 & 9 & 2 \\ -1 & -5 & -6 \end{pmatrix} + \begin{pmatrix} 4 & 0 & -2 \\ -2 & 4 & 6 \end{pmatrix} = \begin{pmatrix} 2 & 9 & 0 \\ -3 & -1 & 0 \end{pmatrix}$

1.8

1. $\mathrm{diag}(D^T \times C^T) = \mathrm{diag}\begin{pmatrix} 2 & 0 \\ 5 & -5 \end{pmatrix} = (2, -5)$

2. $\mathrm{diag}(C \times F + 2D^T) = \mathrm{diag}\begin{pmatrix} 2 & 9 & 0 \\ -3 & -1 & 0 \end{pmatrix} = (2, -1)$

1.9.

$\begin{pmatrix} -1 & -3 & 1 \\ 2 & 2 & 0 \\ 5 & 7 & -2 \end{pmatrix} \sim \begin{pmatrix} 1 & 3 & -1 \\ 0 & -4 & 2 \\ 0 & -8 & 3 \end{pmatrix} \sim \begin{pmatrix} 1 & 3 & -1 \\ 0 & 2 & 1 \\ 0 & 0 & 1 \end{pmatrix}$ ... LN

$\begin{pmatrix} 1 & -1 & -3 \\ 0 & 2 & 2 \\ -1 & 5 & 7 \end{pmatrix} \sim \begin{pmatrix} 1 & -1 & -3 \\ 0 & 1 & 1 \\ 0 & 4 & 4 \end{pmatrix} \sim \begin{pmatrix} 1 & -1 & -3 \\ 0 & 1 & 1 \\ 0 & 0 & 0 \end{pmatrix} \sim \begin{pmatrix} 1 & 0 & -2 \\ 0 & 1 & 1 \\ 0 & 0 & 0 \end{pmatrix}$ ... LZ $\quad -2\begin{pmatrix} 1 \\ 0 \\ -1 \end{pmatrix} + \begin{pmatrix} -1 \\ 2 \\ 5 \end{pmatrix} = \begin{pmatrix} -3 \\ 2 \\ 7 \end{pmatrix}$

1.10

1. $\mathrm{rank}\begin{pmatrix} -1 & -3 & 1 \\ 2 & 2 & 0 \\ 5 & 7 & -2 \end{pmatrix} = \mathrm{rank}\begin{pmatrix} 1 & 3 & -1 \\ 0 & 2 & 1 \\ 0 & 0 & 1 \end{pmatrix} = 3$

2. $\mathrm{rank}\begin{pmatrix} 1 & -1 & -3 \\ 0 & 2 & 2 \\ -1 & 5 & 7 \end{pmatrix} = \mathrm{rank}\begin{pmatrix} 1 & 0 & -2 \\ 0 & 1 & 1 \\ 0 & 0 & 0 \end{pmatrix} = 2$

1.11

1. $$\left(\begin{array}{ccc|c} 2 & -3 & -1 & -7 \\ 3 & 1 & 1 & 4 \\ -1 & 4 & 6 & -3 \end{array}\right) \sim \left(\begin{array}{ccc|c} 1 & -4 & -6 & 3 \\ 0 & 5 & 11 & -13 \\ 0 & 13 & 19 & -5 \end{array}\right) \sim \left(\begin{array}{ccc|c} 1 & -4 & -6 & 3 \\ 0 & 5 & 11 & -13 \\ 0 & 8 & 8 & 8 \end{array}\right) \sim \left(\begin{array}{ccc|c} 1 & -4 & -6 & 3 \\ 0 & 1 & 1 & 1 \\ 0 & 0 & 6 & -18 \end{array}\right) \sim$$

$$\sim \left(\begin{array}{ccc|c} 1 & -4 & -6 & 3 \\ 0 & 1 & 1 & 1 \\ 0 & 0 & 1 & -3 \end{array}\right) \sim \left(\begin{array}{ccc|c} 1 & -4 & 0 & -15 \\ 0 & 1 & 0 & 4 \\ 0 & 0 & 1 & -3 \end{array}\right) \sim \left(\begin{array}{ccc|c} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 4 \\ 0 & 0 & 1 & -3 \end{array}\right)$$

$x_1 = 1 \quad x_2 = 4 \quad x_3 = -3$

2. $$\left(\begin{array}{ccc|c} 2 & -1 & 0 & 4 \\ -3 & 1 & 4 & -1 \\ -1 & 0 & 4 & 1 \end{array}\right) \sim \left(\begin{array}{ccc|c} 1 & 0 & -4 & -1 \\ 0 & -1 & 8 & 6 \\ 0 & 1 & -8 & -4 \end{array}\right) \sim \left(\begin{array}{ccc|c} 1 & 0 & -4 & -1 \\ 0 & 1 & -8 & -4 \\ 0 & 0 & 0 & 2 \end{array}\right)$$

$0 = 2 \Rightarrow$ nemá řešení

1.12

1. $$\begin{vmatrix} 2 & -5 \\ 1 & 4 \end{vmatrix} = 2\cdot 4 - (-5)\cdot 1 = 8 + 5 = 13$$

2. $$\begin{vmatrix} 2 & -1 & 0 \\ -3 & 1 & 4 \\ -1 & 1 & 5 \end{vmatrix} = \begin{vmatrix} 2 & -1 & 0 & 2 & -1 \\ -3 & 1 & 4 & -3 & 1 \\ -1 & 1 & 5 & -1 & 1 \end{vmatrix} = 2\cdot 1\cdot 5 - 1\cdot 4(-1) + 0\cdot(-3)\cdot 1 - (0 + 8 + 15) =$$

$$= 10 + 4 + 0 - 23 = -9$$

1.13

1. $$\begin{vmatrix} 0 & 2 & x \\ -1 & x & 0 \\ 3 & 2 & -1 \end{vmatrix} + \begin{vmatrix} 3 & x & 2 \\ -1 & 0 & 2 \\ x & -1 & x \end{vmatrix} = 4$$

$$\begin{vmatrix} 0 & 2 & x & 0 & 2 \\ -1 & x & 0 & -1 & x \\ 3 & 2 & -1 & 3 & 2 \end{vmatrix} + \begin{vmatrix} 3 & x & 2 & 3 & x \\ -1 & 0 & 2 & -1 & 0 \\ x & -1 & x & x & -1 \end{vmatrix} = 4$$

$$0 + 0 - 2x - (3x^2 + 0 + 2) + (0 + 2x^2 + 2 - (0 - 6 - x^2)) = 4$$

$$-2x \underline{-3x^2} - 2 \underline{+2x^2} + 2 + 6 \underline{+x^2} = 4$$

$$-2x + 6 = 4$$

$$2x = 2$$

$$x = 1$$

CVIČENÍ 2

2.1

1. $D(f) = \mathbb{R}$
2. $H(f) = (0; \infty)$
3. spojitá na celém $D(f)$
4. zdola ohraničená
5. neperiodická
6. ani sudá, ani lichá
7. rostoucí na celém $D(f)$
8. $\lim\limits_{x \to \infty} e^x = \infty \qquad \lim\limits_{x \to -\infty} e^x = 0$

2.2

1. $D(f) = (-\infty; 0) \cup (0; \infty)$
2. $H(f) = (-\infty; 0) \cup (0; \infty)$
3. spojitá na $(-\infty; 0)$ a na $(0; \infty)$
4. neohraničená
5. neperiodická
6. lichá funkce
7. klesající na $(-\infty; 0)$, rostoucí na $(0; \infty)$
8. $\lim\limits_{x \to 0^-} \frac{1}{x} = -\infty \qquad \lim\limits_{x \to 0^+} \frac{1}{x} = \infty \qquad \lim\limits_{x \to \infty} \frac{1}{x} = 0 \qquad \lim\limits_{x \to -\infty} \frac{1}{x} = 0$

2.3

1. $x^2 - 5x + 4 \qquad \pm 1 \;\; \pm 2 \;\; \pm 4$

	1	-5	4	
1	1	-4	0	$x = 1$
1	1	-3		
4	1	0		$x = 4$

$(x-1)(x-4) = x^2 - 5x + 4$

2. $x^3 - 7x - 6 \qquad \pm 1 \;\; \pm 2 \;\; \pm 3 \;\; \pm 6$

	1	0	-7	-6	
1	1	1	-6	-12	
-1	1	-1	-6	0	$x = -1$
-1	1	-2	-4		
2	1	1	-4		
-2	1	-3	0		$x = -2$
3	1	0			$x = 3$

$$(x+1)(x+2)(x-3) = (x^2 + 3x + 2)(x-3)$$
$$= x^3 + 3x^2 + 2x - 3x^2 - 9x - 6$$
$$= x^3 - 7x - 6$$

2.4

1. $\lim\limits_{x\to -2} \dfrac{x^3-3x^2-4x+12}{x^5-2} = \dfrac{-8-12+8+12}{-32-2} = \dfrac{0}{-34} = 0$

2. $\lim\limits_{x\to 0} \dfrac{2^x-6^x-3^x}{2^x+4^x} = \dfrac{2^0-6^0-3^0}{2^0+4^0} = \dfrac{1-1-1}{1+1} = -\dfrac{1}{2}$

3. $\lim\limits_{x\to 4} x^2-3x-4 = 4^2-12-4 = 0$

4. $\lim\limits_{x\to -2} \dfrac{x^3-x^2-4x+4}{x^2-3x-10} = \dfrac{-8-4+8+4}{4+6-10} = \dfrac{0}{0}$

$= \lim\limits_{x\to -2} \dfrac{(x-1)(x-2)(x+2)}{(x+2)(x-5)}$

$= \lim\limits_{x\to -2} \dfrac{(x-1)(x-2)}{(x-5)} =$

$= \dfrac{(-2-1)(-2-2)}{(-2-5)} =$

$= \dfrac{-3(-4)}{-7} = -\dfrac{12}{7}$

$x^3-x^2-4x+4 \qquad \pm1 \ \pm2 \ \pm4$

	1	-1	-4	4	
1	1	0	-4	0	x = 1
1	1	1	-3		
-1	1	-1	-3		
2	1	1	-2	0	x = 2
2	1	3	-4		
-2	1	-1	0		x = -2

$(x-1)(x-2)(x+2)$

$x^2-3x-10 \qquad \pm1 \ \pm2 \ \pm5 \ \pm10$

	1	-3	-10	
1	1	-2	-12	
-1	1	-4	-6	
2	1	-1	-12	
-2	1	-5	0	x = -2
-2	1	-7		
5	1	0		x = 5

$(x+2)(x-5)$

2.5

1. $\lim\limits_{x\to \infty} \dfrac{2}{x^2+x}\cdot x = \lim\limits_{x\to\infty} \dfrac{2x}{x^2+x} = \lim\limits_{x\to\infty} \dfrac{2}{x+1} = \dfrac{2}{\infty+1} = \dfrac{2}{\infty} = 0$

2. $\lim\limits_{x\to \infty} \dfrac{3^x+5^x}{8^x} = \lim\limits_{x\to\infty} \dfrac{3^x}{8^x} + \lim\limits_{x\to\infty} \dfrac{5^x}{8^x} = \lim\limits_{x\to\infty} \left(\dfrac{3}{8}\right)^x + \lim\limits_{x\to\infty} \left(\dfrac{5}{8}\right)^x = 0+0 = 0$

3. $\lim\limits_{x\to -\infty} \dfrac{6x^5-2x^3-8x+2}{3+x^2+4x^4} = \lim\limits_{x\to-\infty} \dfrac{6x^5-2x^3-8x+2}{4x^4+x^2+3} = \lim\limits_{x\to-\infty} \dfrac{x^4\left(6x-\frac{2}{x}-\frac{8}{x^4}+\frac{2}{x^5}\right)}{x^4\left(4+\frac{1}{x^2}+\frac{3}{x^4}\right)} =$

$= \lim\limits_{x\to -\infty} \dfrac{6x-\overset{=0}{\frac{2}{x}}-\overset{=0}{\frac{8}{x^4}}+\overset{=0}{\frac{2}{x^5}}}{4+\underset{=0}{\frac{1}{x^2}}+\underset{=0}{\frac{3}{x^4}}} = \dfrac{-6\infty}{4} = -\infty$

4. $\lim\limits_{x\to \infty} \dfrac{\frac{1}{4^x}+1}{\frac{1}{3^x}-3} = \dfrac{\overset{\to 0}{\frac{1}{4^\infty}}+1}{\underset{\to 0}{\frac{1}{3^\infty}}-3} = -\dfrac{1}{3}$

5. $$\lim_{x\to-\infty}\frac{2x^6-x^5+3x^4-5x}{3x^4+4x^8-3}=\lim_{x\to-\infty}\frac{2x^6-x^5+3x^4-5x}{4x^8+3x^4-3}=\lim_{x\to-\infty}\frac{x^6\left(2-\frac{1}{x}+\frac{3}{x^2}-\frac{5}{x^5}\right)}{x^6\left(4x^2+\frac{3}{x^2}-\frac{3}{x^6}\right)}=$$

$$=\lim_{x\to-\infty}\frac{2-\frac{1}{x}+\frac{3}{x^2}-\frac{5}{x^5}}{4x^2+\frac{3}{x^2}-\frac{3}{x^6}}=\frac{2}{4(-\infty)^2}=\frac{2}{\infty}=0$$

6. $$\lim_{x\to-\infty}\frac{2^x+4^x}{5^x}=\lim_{x\to-\infty}\frac{2^x}{5^x}+\lim_{x\to-\infty}\frac{4^x}{5^x}=\lim_{x\to-\infty}\left(\frac{2}{5}\right)^x+\lim_{x\to-\infty}\left(\frac{4}{5}\right)^x=\left(\frac{2}{5}\right)^{-\infty}+\left(\frac{4}{5}\right)^{-\infty}=$$

$$=\left(\frac{5}{2}\right)^{\infty}+\left(\frac{5}{4}\right)^{\infty}=\infty+\infty=\infty$$

7. $$\lim_{x\to\infty}\frac{3^x-2^x}{3^x}=\lim_{x\to\infty}\frac{3^x}{3^x}-\lim_{x\to\infty}\frac{2^x}{3^x}=\lim_{x\to\infty}\left(\frac{3}{3}\right)^x-\lim_{x\to\infty}\left(\frac{2}{3}\right)^x=1^\infty-\left(\frac{2}{3}\right)^\infty=1-0=1$$

8. $$\lim_{x\to\infty}\frac{-4x^4-x-3}{x^3-x+9x^4-5}=\lim_{x\to\infty}\frac{x^4\left(-4-\frac{1}{x^3}-\frac{3}{x^4}\right)}{x^4\left(9+\frac{1}{x}-\frac{1}{x^3}-\frac{5}{x^4}\right)}=\lim_{x\to\infty}\frac{-4-\frac{1}{x^3}-\frac{3}{x^4}}{9-\frac{1}{x}-\frac{1}{x^3}-\frac{5}{x^4}}=-\frac{4}{9}$$

2.6

1. $(x^5-4x^4-5x^2-x-3)'=5x^4-16x^3-10x-1$

2. $(\cos^4 x+\tan 3x)'=4\cos^3 x\,(-\sin x)+\frac{1}{\cos^2 3x}\,3=-4\sin x\cos^3 x+\frac{3}{\cos^2 3x}$

3. $$\left(\frac{4-\cos x}{e^x}\right)'=\left(\frac{\sin x\, e^x-(4-\cos x)e^x}{e^{2x}}\right)=\frac{\sin x-4+\cos x}{e^x}$$

4. $$(e^x\sin x-4\ln x\cos x)'=e^x\sin x+e^x\cos x-\frac{4}{x}\cos x+4\ln x\sin x=\sin x(e^x+4\ln x)$$
$$=\sin x(e^x+4\ln x)+\cos x\left(e^x-\frac{4}{x}\right)$$

5. $$\left(\frac{x^2+x-6}{x+3}\right)'=\frac{(2x+1)(x+3)-(x^2+x-6)\cdot 1}{(x+3)^2}=\frac{2x^2+6x+x+3-x^2-x+6}{(x+3)^2}=\frac{x^2+6x+9}{(x+3)^2}$$
$$=\frac{(x+3)^2}{(x+3)^2}=1$$

6. $(x^7-x^{-7}-x^0-\ln x+\tan x)'=7x^6+7x^{-8}-0-\frac{1}{x}+\frac{1}{\cos^2 x}$

7. $$((2-x^2)\sin x-x^3\cos x)'=-2x\sin x+(2-x^2)\cos x-3x^2\cos x+x^3\sin x=$$
$$=\sin x(x^3-2x)+\cos x(2-x^2-3x^2)$$
$$=x\sin x(x^2-2)+2\cos x(1-2x^2)$$

8. $\left(\frac{xe^{4x}-2}{2x}\right)' = \left(\frac{(e^{4x}+xe^{4x}4)2x-(xe^{4x}-2)2}{4x^2}\right) = \frac{2xe^{4x}+8x^2e^{4x}-2xe^{4x}+4}{4x^2} = 2e^{4x}+\frac{1}{x^2}$

2.7

1. $(\cos x \ln x)'' = (-\sin x \ln x + \cos x \frac{1}{x})' = -\cos x \ln x - \sin x \frac{1}{x} - \sin x \frac{1}{x} - \cos x \frac{1}{x^2} =$

$= -\frac{2}{x}\sin x - \cos x\left(\ln x + \frac{1}{x^2}\right)$

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

2. $(x^5 - x^4 - 5x^2 + x - 3)'' = (5x^4 - 4x^3 - 10x + 1)' = 20x^3 - 12x^2 - 10 = 2(10x^3 - 6x^2 - 5)$

3. $\left(\frac{\ln x^2}{x}\right)'' = \left(\ln x^2 \cdot \frac{1}{x}\right)'' = \left(\frac{1}{x^2}2x \cdot \frac{1}{x} + \ln x^2 \frac{1}{x^2}(-1)\right)' = \left(\frac{2}{x^2} - \ln x^2 \cdot \frac{1}{x^2}\right)' =$

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

$= \frac{-6+2\ln x^2}{x^3} = \frac{2(\ln x^2 - 3)}{x^3}$

4. $(x\cos x)'' = (\cos x - x\sin x)' = -\sin x - \sin x - x\cos x = -2\sin x - x\cos x$

2.8

1. $\lim_{x \to -2} \frac{x^3 - x^2 - 4x + 4}{x^2 - 3x - 10} = \frac{-8-4+8+4}{4+6-10} = \frac{0}{0}$ => L'Hosp. ANO

$= \lim_{x \to -2} \frac{(x^3-x^2-4x+4)'}{(x^2-3x-10)'} = \lim_{x \to -2} \frac{3x^2-2x-4}{2x-3} = \frac{3 \cdot 4 + 4 - 4}{-4-3} = \frac{12}{-7} = -\frac{12}{7}$

2. $\lim_{x \to -2} \frac{x^3 - x^2 + 4x + 4}{x^2 - 3x - 10} = \frac{-8-4-8+4}{4+6-10} = \frac{-16}{0}$ => L'Hosp. NE

$\lim_{x \to -2^+} = \frac{-16}{-0} = \infty \quad \lim_{x \to -2^-} \frac{-16}{+0} = -\infty$ ... $\lim_{x \to -2} f(x)$ neexistuje

3. $\lim_{x \to 1} \frac{2x^3 - 3x^2 - 2x + 3}{5x^2 - 8x + 3} = \frac{2-3-2+3}{5-8+3} = \frac{0}{0}$ => L'Hosp. ANO

$= \lim_{x \to 1} \frac{(2x^3-3x^2-2x+3)'}{(5x^2-8x+3)'} = \lim_{x \to 1} \frac{6x^2-6x-2}{10x-8} = \frac{6-6-2}{10-8} = \frac{-2}{2} = -1$