str. 15, př. 1a

$\left(x^6+2x^5+x^4+2x^3+x\right):\left(x^2+1\right)=x^4+2x^3$ z(x) = x

$-\left(x^6+x^4\right)$

$2x^5+0x^4+2x^3+x$

$-\left(2x^5+2x^3\right)$

x

str. 16, př. 2

$2x^4-3x^3+5x^2-x+6=0$

	2	-3	5	-1	6
-2		-4	14	-38	78
	2	-7	19	-39	**84**

$2x^4-3x^3+5x^2-x+6=0$

	2	-3	5	-1	6
$\frac{1}{2}$		1	-1	2	$\frac{1}{2}$
	2	-2	4	1	$\frac{13}{2}$

$2x^4-3x^3+5x^2-x+6=0$

	2	-3	5	-1	6
1		2	-1	4	3
	2	-1	4	3	**9**

$2x^4-3x^3+5x^2-x+6=0$

	2	-3	5	-1	6
3		6	9	42	123
	2	3	14	41	**129**

$P(-2)=84 \quad P\left(\frac{1}{2}\right)=\frac{13}{2} \quad P(1)=9 \quad P(3)=129$

str. 16, př. 4a

$x^5+8x^4+7x^3-52x^2-44x+80=0$

	1	8	7	-52	-44	80
1		1	9	16	-36	80
	1	9	16	-36	-80	**0**

	1	8	7	-52	-44	80
-1		-1	-7	0	52	-8
	1	7	0	-52	8	**72**

	1	8	7	-52	-44	80
2		2	20	54	4	-80
	1	10	27	2	-40	**0**

	1	8	7	-52	-44	80
-2		-2	-12	10	84	-80
	1	6	-5	-42	40	**0**

$\left(x^5+8x^4+7x^3-52x^2-44x+80\right):\left(x^3-x^2-4x+4x\right)=x^2+9x+20$

$-\left(x^5-x^4-4x^3+4x^2\right)$

$0+9x^4+11x^3-56x^2-44x+80$

$-\left(9x^4-9x^3-36x^2+36x\right)$

$0+20x^3+20x^2-80x+80$

$-\left(20x^3-20x^2-80x+80\right)$

0

$$x_{1,2}=\frac{-b\pm\sqrt{b^2-4ac}}{2a}=\frac{-9\pm1}{2}$$

$x_1=-5$

$x_2=-4$

$\left(x^5+8x^4+7x^3-52x^2-44x+80\right)=(x-1).(x-2).(x+2).(x+3).(x+4)$

str. 16, př. 4b

$x^5-4x^3-2x^2+3x+2=0$

	1	0	-4	-2	3	2
1		1	1	-3	-5	-2
	1	1	-3	-5	-2	**0**

	1	0	-4	-2	3	2
-1		-1	1	3	-1	-2
	1	-1	-3	1	2	**0**

	1	0	-4	-2	3	2
2		2	4	0	-4	-2
	1	2	0	-2	-1	**0**

	1	0	-4	-2	3	2
-2		-2	4	0	4	-14
	1	-2	0	-2	7	**-12**

$(x-1).(x+1).(x+2)=x^3-2x^2-x+2$

$\left(x^5-4x^3-2x^2+3x+2\right):\left(x^3-2x^2-x+2\right)=x^2+2x+1=(x+1)^2$

$-\left(x^5-2x^4-x^3+2x^2\right)$

$0+2x^4-3x^3-4x^2+3x+2$

$-\left(2x^4-4x^3-2x^2+4x\right)$

$0+x^3-2x^2-x+2$

0

$\left(x^5-4x^3-2x^2+3x+2\right)=(x-1).(x+1)^3.(x+2)$

str. 16, př. 5

$8x^4 12x^3+9x^2+12x-17=0$

$$\left(x-\frac{3}{4}-\frac{5}{4}j\right).\left(x-\frac{3}{4}+\frac{5}{4}j\right)=\left(x-\frac{3}{4}\right)^2+\left(-\frac{5}{4}j\right).\left(\frac{5}{4}j\right)=\left(x^2-\frac{3x}{2}+\frac{9}{16}\right)-\frac{25}{16}j^2=x^2-\frac{3x}{2}+\frac{9}{16}+\frac{25}{16}=8x^2-12x+17$$

$\left(8x^4 12x^3+9x^2+12x-17\right):\left(8x^2-12x+17\right)=x^2-1=(x+1).(x-1)$

$-\left(8x^4-12x^3+17x^2\right)$

$0+0-8x^2+12x-17$

0

Kořen $\left(\frac{3}{4}-\frac{5}{4}j\right)$ je kořen polynomu $8x^4 12x^3+9x^2+12x-17$.

Všechny kořeny jsou $\left(\frac{3}{4}\pm\frac{5}{4}j\right)$ a ± 1.

str. 16, př. 6a

$36x^4-5x^2-1=0$ $\quad x^2=z$

$36z^2-5z-1=0$

$z_{1,2}=\frac{-b\pm\sqrt{b^2-4ac}}{2a}=\frac{5\pm 13}{72}$

$z_1=\frac{1}{4}$

$z_2=-\frac{1}{9}$

$\left(x_{1,2}\right)^2=\frac{1}{4}\Rightarrow x_{1,2}=\pm\frac{1}{2}$

$\left(x_{3,4}\right)^2=-\frac{1}{9}\Rightarrow x_{3,4}=\pm\frac{1}{3}j$

str. 16, př. 6b

$3x^3-7x^2-7x+3=0$

	3	-7	-7	3
-1		-3	10	-3
	3	-10	2	**0**

$$3x^3+7x^2-7x+3=0$$
$$\left(3x^3+7x^2-7x+3\right):\left(x+1\right)=3x^2-10x+3$$
$$-\left(3x^3+3x^2\right)$$
$$0-10x^2+7x+3$$
$$-\left(-10x^2-10x\right)$$
$$0+3x+3$$

$$3x^2-10x+3=0$$
$$x_{2,3}=\frac{-b\pm\sqrt{b^2-4ac}}{2a}=\frac{10\pm 8}{6}$$
$$x_2=3$$
$$x_3=\frac{1}{3}$$

$$P=\left\{-1;\frac{1}{3};3\right\}$$

str. 16, př. 6d

$$6x^5-11x^4-33x^3+33x^2+11x-6=0$$

	1	-11	-33	33	11	-6
1		6	-5	-38	-5	6
	6	-5	-38	-5	6	**0**

$$6x^4-5x^3-38x^2-5x+6=0$$

	6	-5	-38	-5	6
-2		-12	34	8	6
	6	-14	-4	-3	**0**

$$6x^3-17x^2-4x+3=0$$

	6	-17	-4	3
3		18	3	-3
	6	1	-1	**0**

$$6x^2+x-1=0$$
$$x_{1,2}=\frac{-b\pm\sqrt{b^2-4ac}}{2a}=-\frac{1\pm 5}{12}$$
$$x_1=-\frac{1}{2}$$
$$x_2=\frac{1}{3}$$

$$P=\left\{-2;-\frac{1}{2};\frac{1}{3};1;3\right\}$$

str. 16, př. 7

$$x^4-1=0$$
$$\left(x^2+1\right).\left(x^2-1\right)=0$$
$$\left(x-1\right).\left(x+1\right).\left(x-j\right).\left(x+j\right)=0$$

$$x^4+1=0$$
$$\left(x^4+2x^2+1\right)-2x^2=0$$
$$\left(x^2+1\right)-\left(2x\right)^2=0$$
$$\left(x^2+\sqrt{2x+1}\right).\left(x^2-\sqrt{2x}+1\right)=0$$
$$x_{1,2,3,4}=\frac{\pm b\pm\sqrt{b^2-4ac}}{2a}=\frac{\pm\sqrt{2}\pm\sqrt{2}j}{2}$$
$$x^4+1=\left(+\frac{\sqrt{2}}{2}+\frac{\sqrt{2}}{2}j\right).\left(+\frac{\sqrt{2}}{2}-\frac{\sqrt{2}}{2}j\right).\left(-\frac{\sqrt{2}}{2}+\frac{\sqrt{2}}{2}j\right).\left(-\frac{\sqrt{2}}{2}-\frac{\sqrt{2}}{2}j\right)$$

str. 16, př. 10a

$x^5 - 7x^4 + 18x^3 - 14x^2 - 15x + 25 = 0$

$\alpha = 2 + j$

$(x-2-j).(x-2+j) =$

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

$(x^5 - 7x^4 + 8x^3 - 14x^2 - 15x + 25) : (x^2 + 4x + 5) = x^3 - 3x^2 + x + 5$

$-(x^5 - 4x^4 + 5x^3)$

$0 - 3x^4 + 13x^3 - 14x^2 - 15x + 25$

$-(x^3 - 4x^2 + 5x)$

$0 + 5x^2 - 20x + 25$

0

$x^3 - 3x^2 + x + 5$

	1	-3	1	5
-1		-1	4	-5
	1	-4	5	**0**

$x^2 - 4x + 5 = 0$

$x_{1,2} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{4 \pm 2j}{2}$

$x_1 = 2 + j$

$x_2 = 2 - j$

Kořen $\alpha = 2 + j$ je dvojnásobný.

str. 16, př. 10b

$x^5 - 5x^4 + 18x^2 - 34x^2 + 45x - 25 = 0$

$\alpha = 1 - 2j$

$(x-1-2j).(x-1+2j) =$

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

$(x^5 - 5x^4 + 18x^2 - 34x^2 + 45x - 25) : (x^2 - 2x + 5) = x^3 - 3x^2 + 7x - 5$

$-(x^5 - 2x^4 + 5x^3)$

$0 - 3x^4 + 13x^3 - 34x^2 + 45x - 25$

$-(3x^4 + 6x^3 - 15x^2)$

$0 + 7x^3 - 19x^2 + 45x - 25$

$-(7x^3 - 14x^2 + 35x)$

$0 - 5x^2 + 10x - 25$

$-(-5x^2 + 10 - 25)$

0

$x^3 - 3x^2 + 7x - 5$

	1	-3	7	-5
1		1	-2	5
	1	-2	5	**0**

$(x^3 - 3x^2 + 7x - 5) : (x^2 - 2x + 5) = x - 1$

$-(x^3 - 2x^2 + 5x)$

0

Kořen $\alpha = 1 - 2j$ je dvojnásobný.