Separace kořenů polynomu

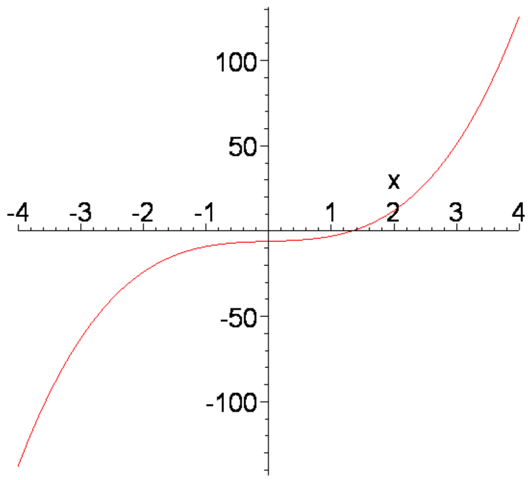
ÚKOL: Proveďte separaci kořenů daných polynomů.
U vybraných polynomů si vyzkoušejte aproximaci reálných kořenů
1) metodou půlení intervalu,
2) Newtonovou metodou.
Přesnost aproximace si sami zvolte.

a)

```
> restart;
> g1:=2*x^3+x-6;
```

$$g1 := 2\,x^3 + x - 6$$

```
> plot(g1,x=-4..4);
```




```
> factor(g1,complex);
```

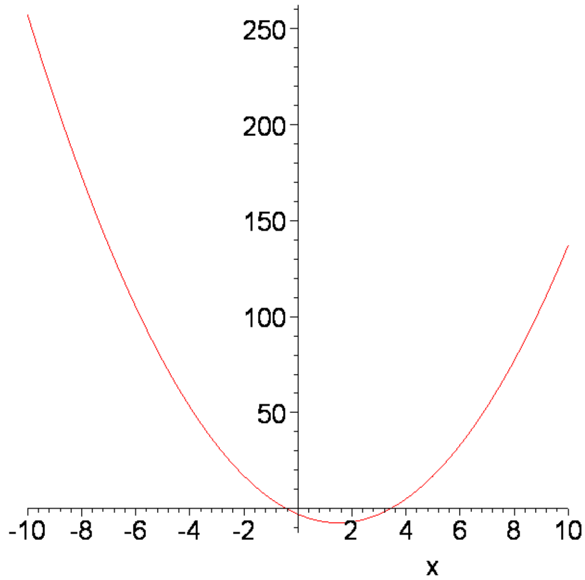
$$2.\,(x + 0.6634781428 + 1.349299721\,I)\,(x + 0.6634781428 - 1.349299721\,I)\,(x - 1.326956286)$$

b)

```
> restart;
> g2:=2*x^2-6*x-3;
```

$$g2 := 2\,x^2 - 6\,x - 3$$

```
> plot(g2,x);
```




```
> factor(g2,complex);
```

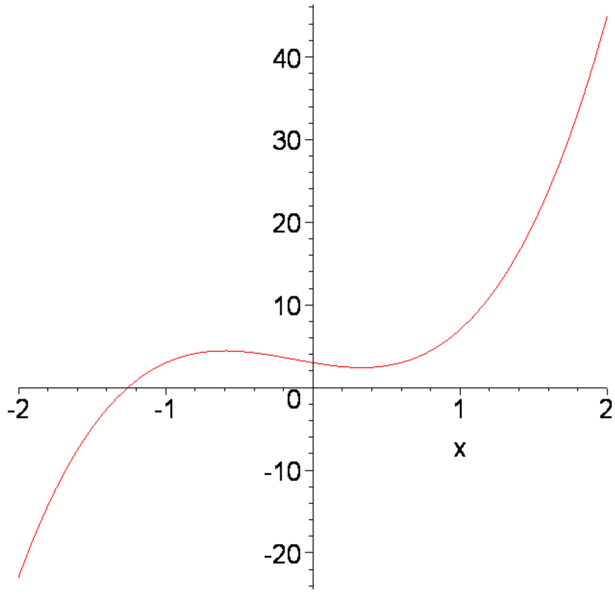
$$2.\ (x + 0.4364916731)\ (x - 3.436491673)$$

c)

```
> restart;
> g3:=5*x^3+2*x^2-3*x+3;
```

$$g3 := 5\,x^3 + 2\,x^2 - 3\,x + 3$$

```
> plot(g3,x=-2..2);
```




```
> factor(g3,complex);
```

$$5.\ (x + 1.257031266)\ (x - 0.4285156328 + 0.5419312217\ I)\ (x - 0.4285156328 - 0.5419312217\ I)$$

```
> g3:=unapply(g3,x);
```

$$g3 := x \rightarrow 5\,x^3 + 2\,x^2 - 3\,x + 3$$

```
> g3(0); g3(1.6); g3(1/3);
```

$$3$$

$$23.800$$

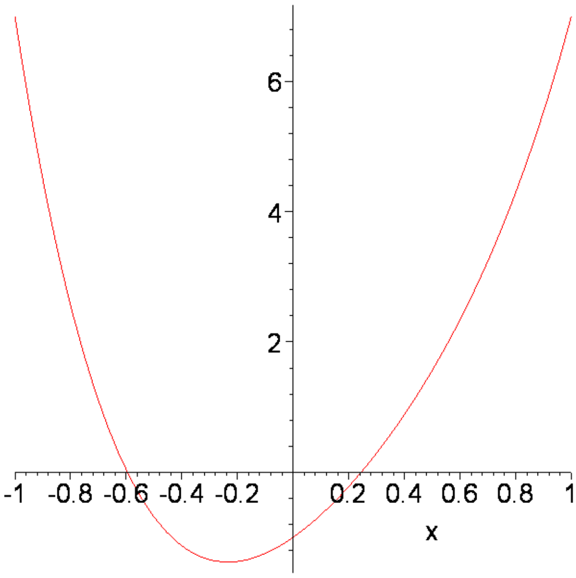
$$\frac{65}{27}$$

d)

```
> restart;
> g4:=3*x^4-3*x^3+5*x^2+3*x-1;
```

$$g4 := 3\,x^4 - 3\,x^3 + 5\,x^2 + 3\,x - 1$$

```
> plot(g4,x=-1..1);
```




```
> factor(g4,complex);
```

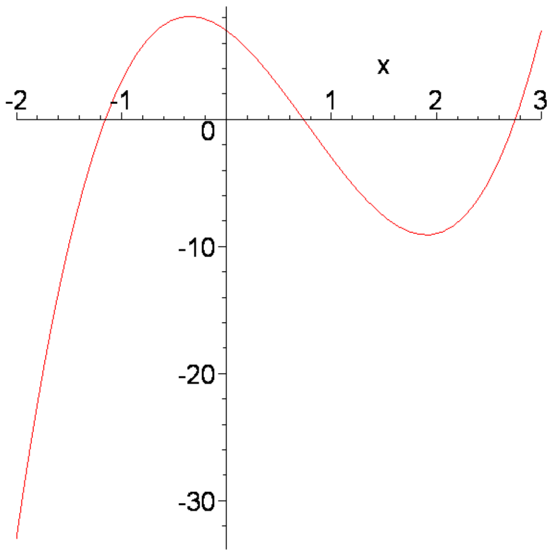
$$3.\,(x + 0.5957996999)\,(x - 0.2446429351)\,(x - 0.6755783824 + 1.352954745\,I)\,(x - 0.6755783824 - 1.352954745\,I)$$

e)

```
> restart;
> g5:=3*x^3-7*x^2-6*x+7;
```

$$g5 := 3\,x^3 - 7\,x^2 - 6\,x + 7$$

```
> plot(g5,x=-2..3);
```



```
> factor(g5,complex);
```

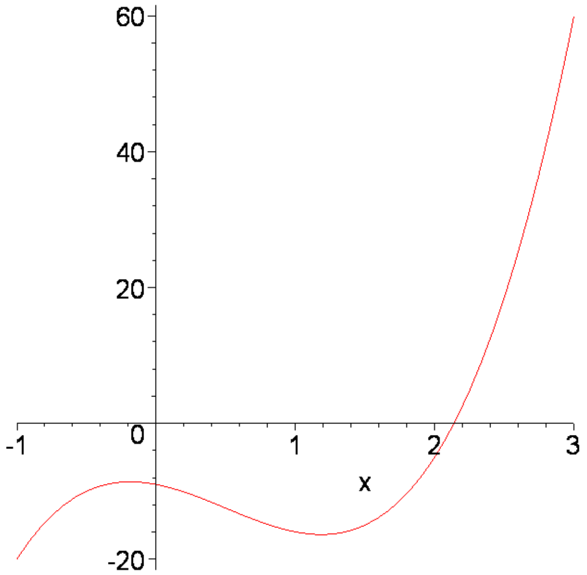
$$3.\ (x + 1.153619930)\ (x - 0.7349668467)\ (x - 2.751986416)$$

f)

```
> restart;
> g6:=6*x^3-9*x^2-4*x-9;
```

$$g6 := 6\ x^3 - 9\ x^2 - 4\ x - 9$$

```
> plot(g6,x=-1..3);
```




```
> factor(g6,complex);
```

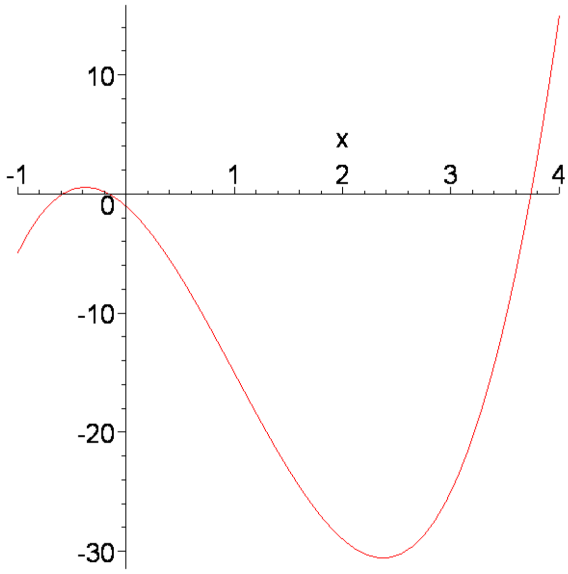
$$6.\ (x + 0.3196783461 + 0.7739193153\ I)\ (x + 0.3196783461 - 0.7739193153\ I)\ (x - 2.139356692)$$

g)

```
> restart;
> g7:=3*x^3-9*x^2-8*x-1;
```

$$g7 := 3\ x^3 - 9\ x^2 - 8\ x - 1$$

```
> plot(g7,x=-1..4);
```




```
> factor(g7,complex);
```

$$3.\ (x+0.5848876912)\ (x+0.1524892949)\ (x-3.737376986)$$

```
> g7:=unapply(g7,x);
```

$$g7 := x \to 3\,x^3 - 9\,x^2 - 8\,x - 1$$

```
> Tabulka:=matrix([['x','g7(x)'],seq([x,g7(x)],x=-4..4)]);
```

$$Tabulka := \begin{bmatrix} x & g7(x) \\ -4 & -305 \\ -3 & -139 \\ -2 & -45 \\ -1 & -5 \\ 0 & -1 \\ 1 & -15 \\ 2 & -29 \\ 3 & -25 \\ 4 & 15 \end{bmatrix}$$

```
> g7(-1/2);
```

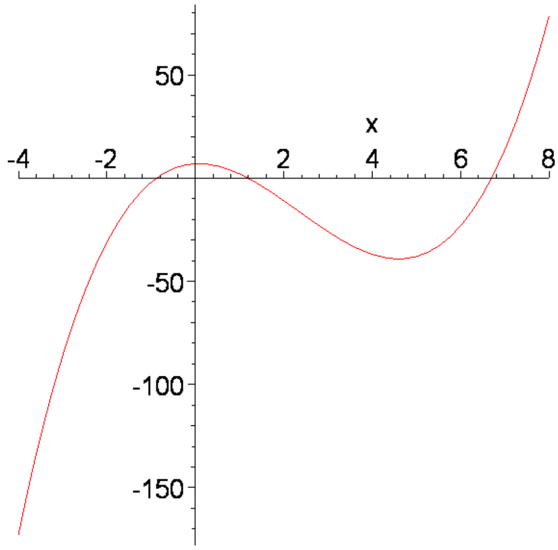
$$\frac{3}{8}$$

h)

```
> restart;
> g8:=x^3-7*x^2+x+7;
```

$$g8 := x^3 - 7\,x^2 + x + 7$$

```
> plot(g8,x=-4..8);
```




```
> factor(g8,complex);
```

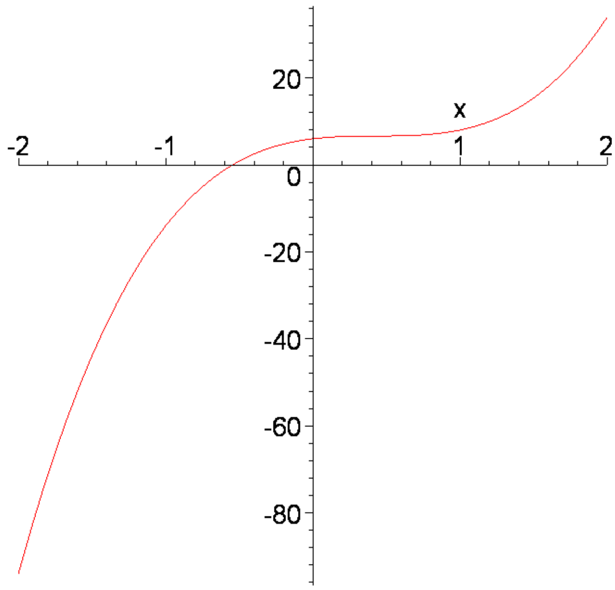
$$(x + 0.8811324815)(x - 1.186707044)(x - 6.694425438)$$

i)

```
> restart;
> g9:=7*x^3-9*x^2+4*x+6;
```

$$g9 := 7\,x^3 - 9\,x^2 + 4\,x + 6$$

```
> plot(g9,x=-2..2);
```




```
> factor(g9,complex);
```

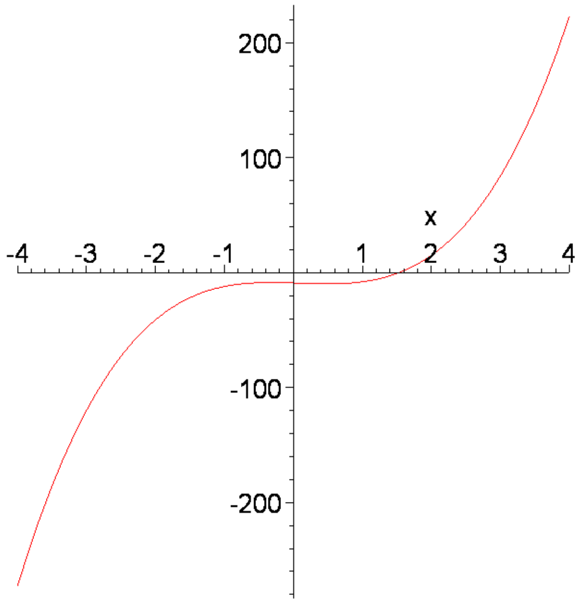
$$7.\,(x + 0.5456791458)(x - 0.9156967158 + 0.8557343627\,I)$$
$$(x - 0.9156967158 - 0.8557343627\,I)$$

j)

```
> restart;
> g10:=4*x^3-x^2-2*x-9;
```

$$g10 := 4\,x^3 - x^2 - 2\,x - 9$$

```
> plot(g10,x=-4..4);
```




```
> factor(g10,complex);
```

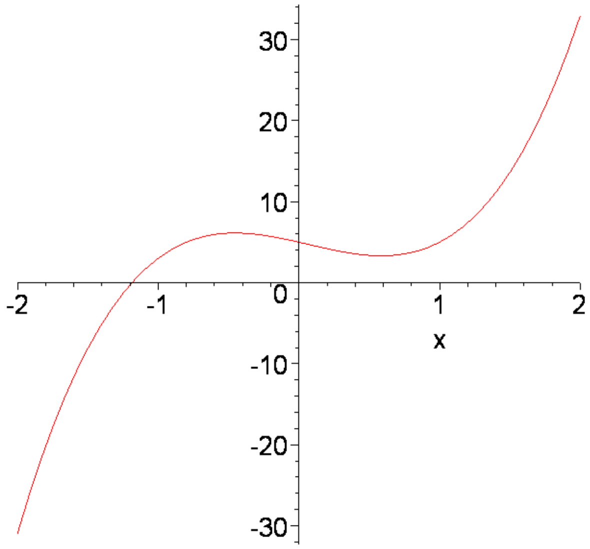
$$4.\,(x + 0.6416154594 + 1.027530497\,I)\,(x + 0.6416154594 - 1.027530497\,I)\,(x - 1.533230919)$$

k)

```
> restart;
> g11:=5*x^3-x^2-4*x+5;
```

$$g11 := 5\,x^3 - x^2 - 4\,x + 5$$

```
> plot(g11,x=-2..2);
```




```
> factor(g11,complex);
```

$$5.\,(x + 1.185809410)\,(x - 0.6929047051 + 0.6026515652\,I)\,(x - 0.6929047051 - 0.6026515652\,I)$$

```
>
```