

```
> restart
```

```
3)
```

```
> g := (x**2+x+2)/(2*x-2)
```

$$g := \frac{x^2 + x + 2}{2x - 2} \quad (1)$$

```
a) Kdyz g'(x)=0 a g''(x)>0 -> minimum g''(x)<0 -> maximum
```

```
> solve(diff(g,x)=0, x); # body pozerele z (lokalnich) extremu
```

$$3, -1 \quad (2)$$

```
> subs(x=3,diff(g, x,x)); # Minimum v bod 3
```

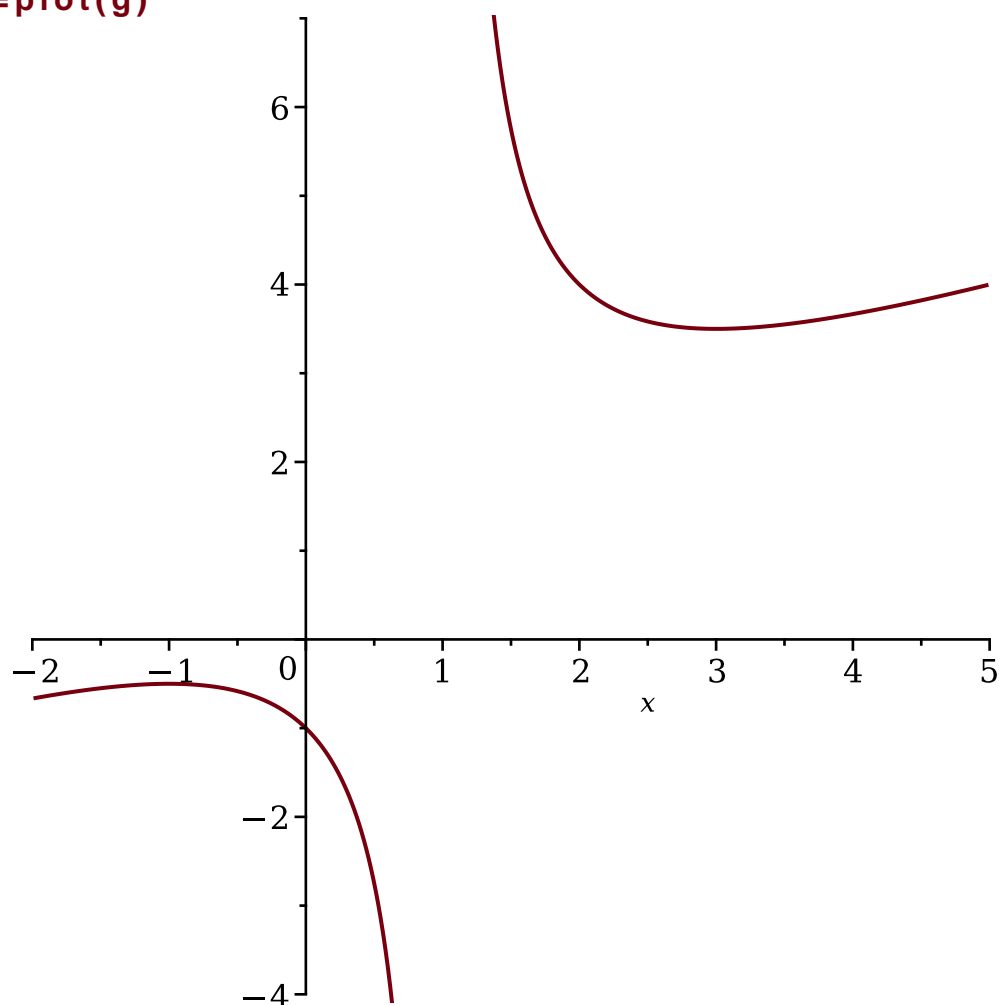
$$\frac{1}{2} \quad (3)$$

```
> subs(x=-1, diff(g, x,x)); # Maximum v bod -1
```

$$-\frac{1}{2} \quad (4)$$

```
b) Ve stacionarnich bodech (sp) se meni znamenko derivace
```

```
> graf :=plot(g)
```



```
1. Interval je -infy do -1, kde je fce rostouci (lze ukazat dosazenim jednoho x z tohoto intervalu do 1. derivace
```

```
> evalb(subs(x=-1.5, diff(g, x))>0); # Roste
true (5)
```

2. Interval je -1 do 1 (v 1 neni fce g def)

```
> evalb(subs(x=0, diff(g,x)<0)); # Klesa
```

3. Interval je od 1 do 3

```
true (6)
```

```
> evalb(subs(x=1.5, diff(g,x)<0)); # Klesa
```

```
true (7)
```

4. Interval je od 3 do +infy

```
> evalb(subs(x=4, diff(g,x)>0)); # Klesa
```

```
true (8)
```

c) lim

```
> Limit(g, x=-infinity)=limit(g, x=-infinity)
```

$$\lim_{x \rightarrow -\infty} \frac{x^2 + x + 2}{2x - 2} = -\infty \quad (9)$$

```
> Limit(g, x=infinity)=limit(g, x=infinity)
```

$$\lim_{x \rightarrow \infty} \frac{x^2 + x + 2}{2x - 2} = \infty \quad (10)$$

```
> Limit(g, x=1)=limit(g, x=1); # Ale jednostranne jsou
```

$$\lim_{x \rightarrow 1} \frac{x^2 + x + 2}{2x - 2} = \text{undefined} \quad (11)$$

```
> Limit(g, x=1, left)=limit(g, x=1, left)
```

$$\lim_{x \rightarrow 1-} \frac{x^2 + x + 2}{2x - 2} = -\infty \quad (12)$$

```
> Limit(g, x=1, right)=limit(g, x=1, right)
```

$$\lim_{x \rightarrow 1+} \frac{x^2 + x + 2}{2x - 2} = \infty \quad (13)$$

d)

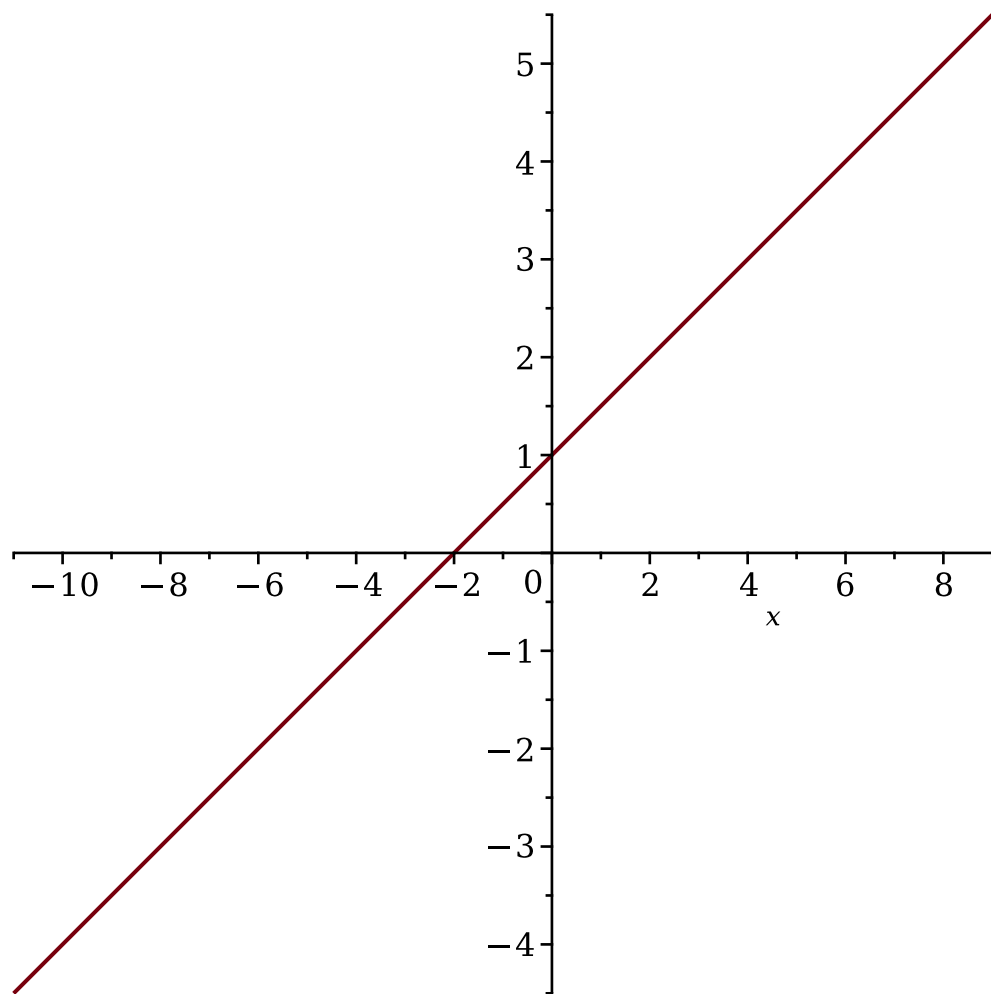
```
> a := limit(g/x, x=infinity)
```

$$a := \frac{1}{2} \quad (14)$$

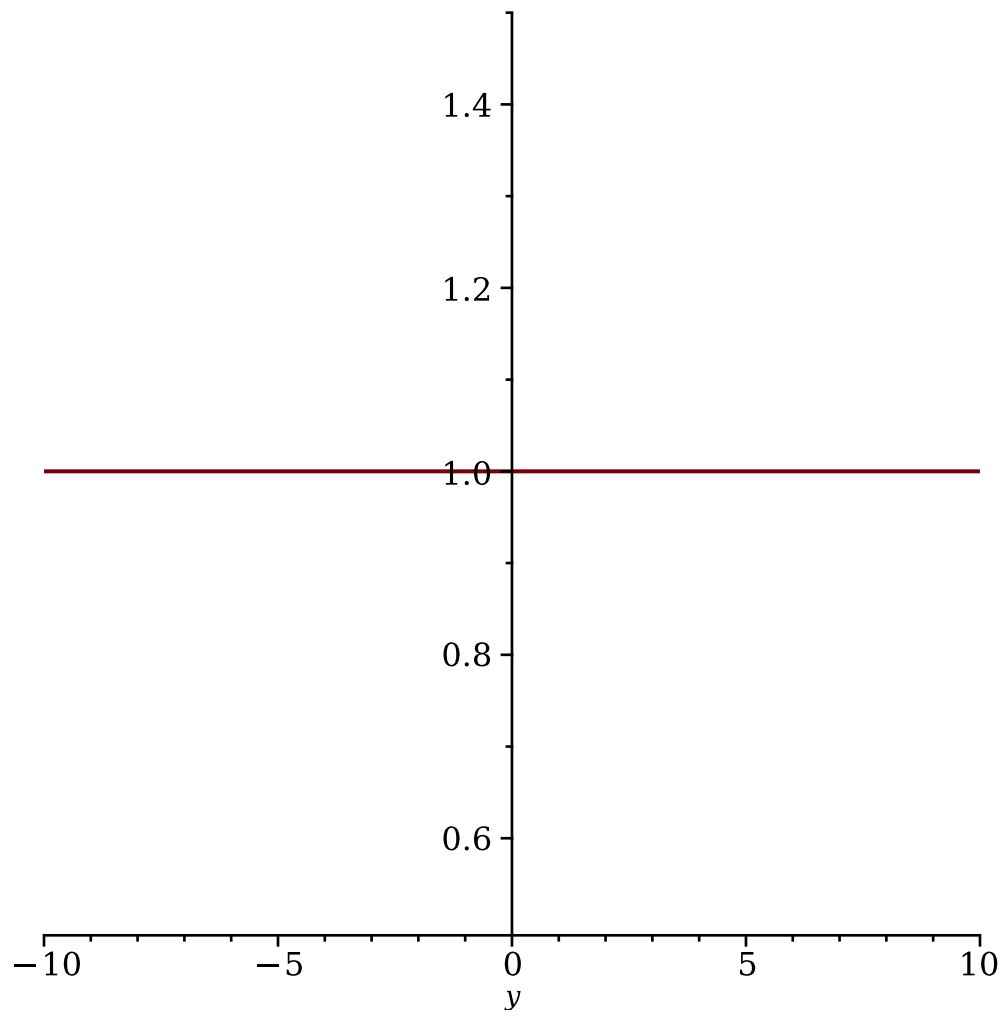
```
> b := limit(g - 1/2*x, x=infinity)
```

$$b := 1 \quad (15)$$

```
> obecna := plot(1/2*x+1)
```

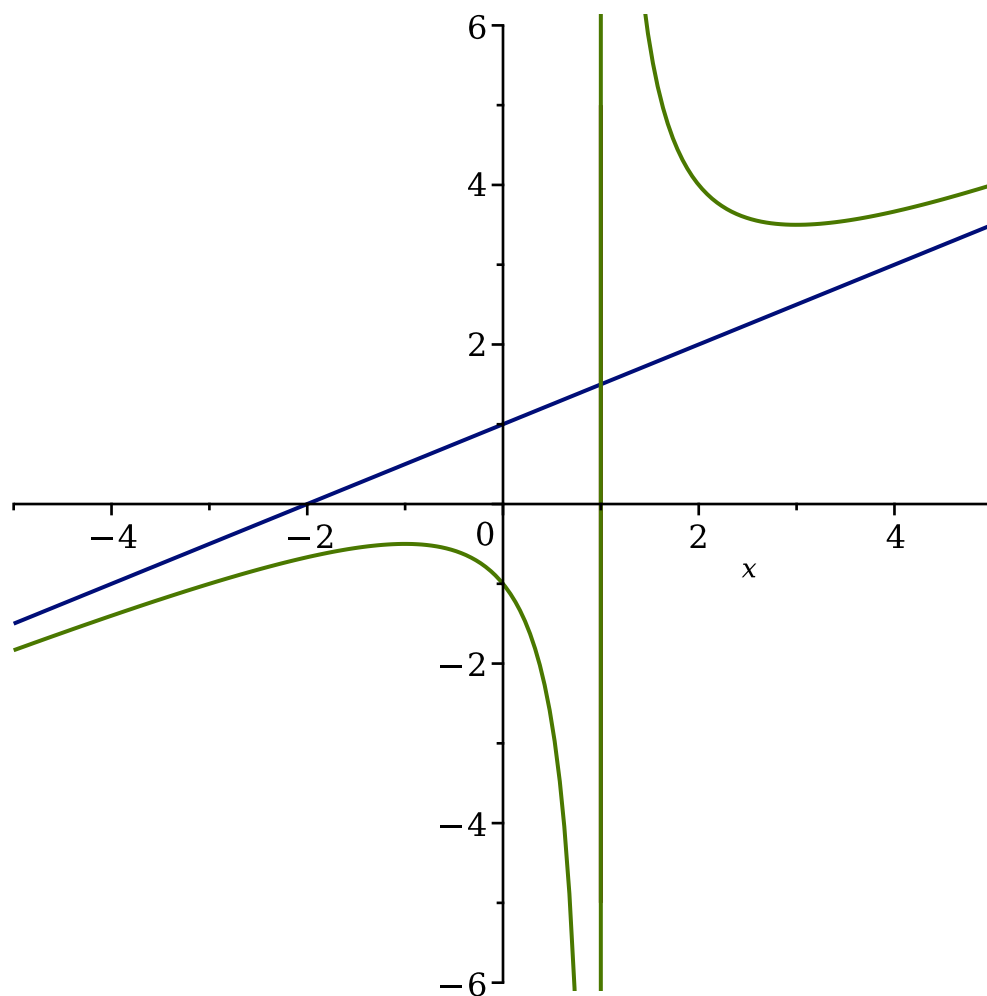


```
> svisla := plot(1,y)
```



=
e)

```
> plot([[1,y, y=-5..5], 1/2*x+1, g],x=-5..5)
```



1)

a)

```
> limit((2*x+3)/(2*x+1)**(x+1), x=infinity)
```

0

(16)

b)

```
> der := diff(sqrt((1-x)/(1+x)), x,x)
```

$$der := -\frac{\left(-\frac{1}{x+1} - \frac{1-x}{(x+1)^2}\right)^2}{4\left(\frac{1-x}{x+1}\right)^{3/2}} + \frac{\frac{2}{(x+1)^2} + \frac{2(1-x)}{(x+1)^3}}{2\sqrt{\frac{1-x}{x+1}}}$$

(17)

```
> subs(x=0, der)
```

1

(18)

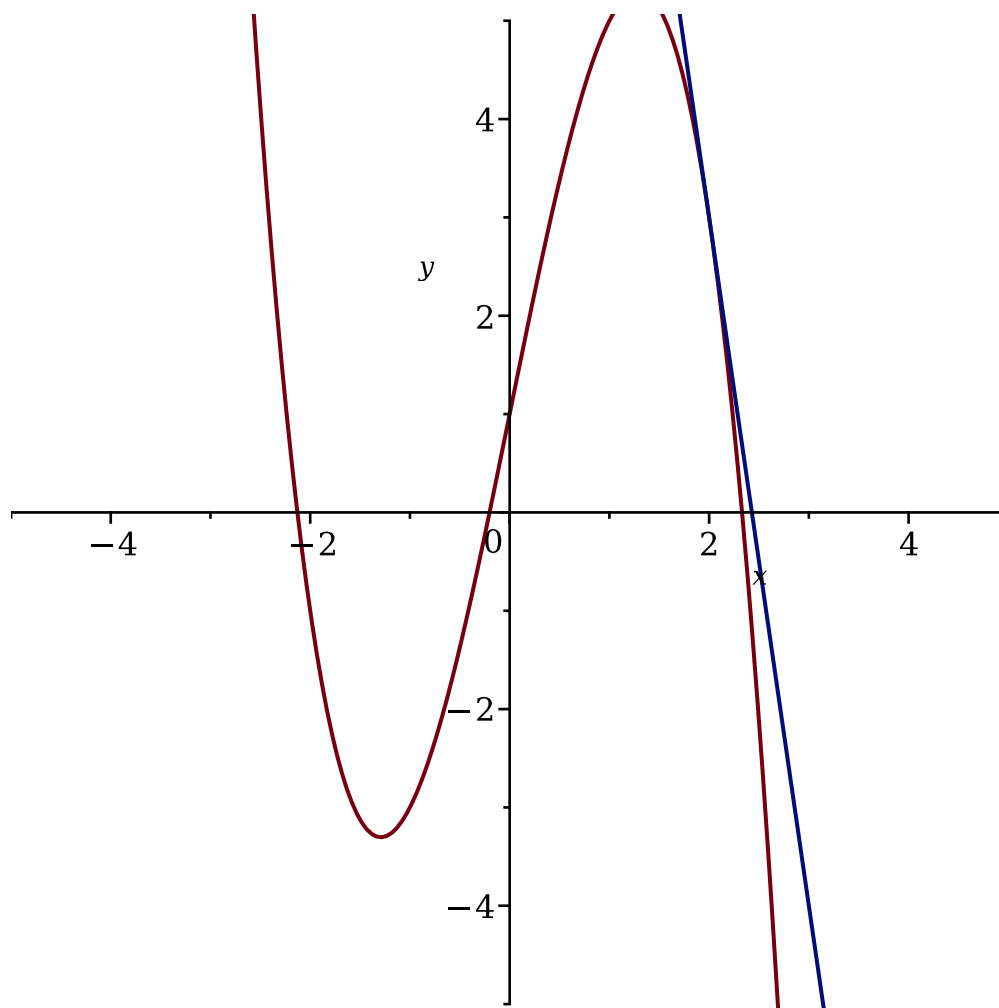
2)

```
> h := (5*x-x**3 +1)
```

$$h := -x^3 + 5x + 1$$

(19)

```
> plot([h, -7*x+17], x=-5..5, y=-5..5)
```



```
> der := subs(x=2, diff(h, x))
      der := -7
```

(20)

$$k := \frac{1}{2}$$

(21)

$$q := -\infty$$

(22)

```
Error, `:` unexpected
```