

Soustavy lineárních rovnic

Řešitelnost soustavy

A. Soustava dvou rovnic o dvou neznámých

```
[ > restart;
```

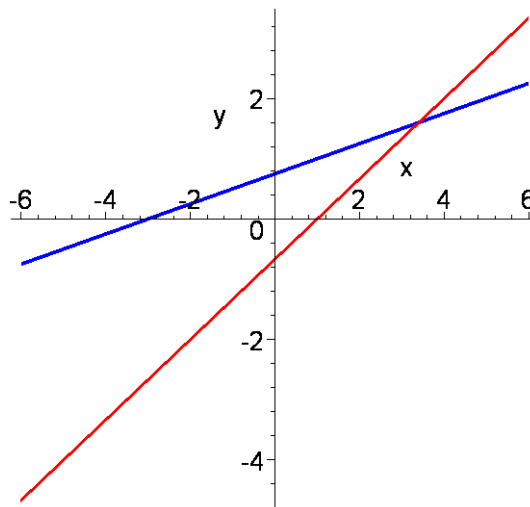
1) Právě jedno řešení

```
[ > p1:=2*x-3*y=2; p2:=-x+4*y=3;
```

$$p1 := 2x - 3y = 2$$

$$p2 := -x + 4y = 3$$

```
[ > plots[implicitplot]([p1,p2],x=-6..6,y=-6..6,color=[red,blue],thickness=4);
```



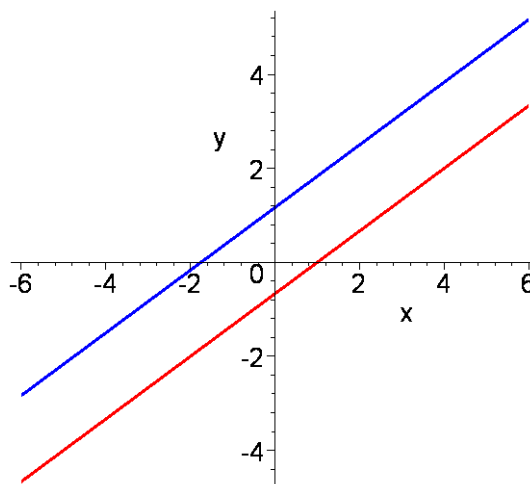
2) Žádné řešení

```
[ > q1:=2*x-3*y=2; q2:=-4*x+6*y=7;
```

$$q1 := 2x - 3y = 2$$

$$q2 := -4x + 6y = 7$$

```
[ > plots[implicitplot]([q1,q2],x=-6..6,y=-6..6,color=[red,blue],thickness=4);
```



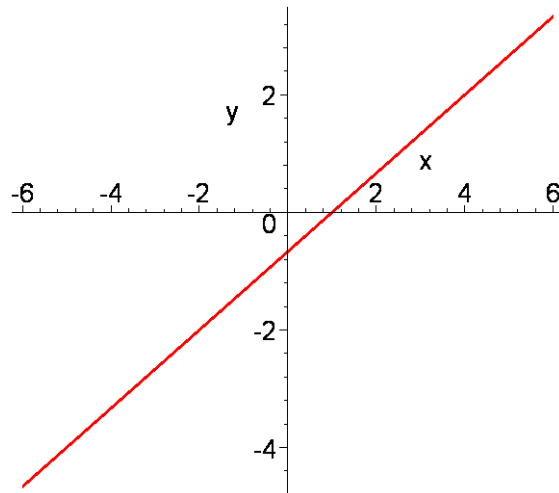
3) Nekonečně mnoho řešení

```
> r1:=2*x-3*y=2; r2:=-4*x+6*y=-4;
```

$$r1 := 2x - 3y = 2$$

$$r2 := -4x + 6y = -4$$

```
> plots[implicitplot]([r1,r2],x=-6..6,y=-6..6,color=[red,blue],thickness=4);
```

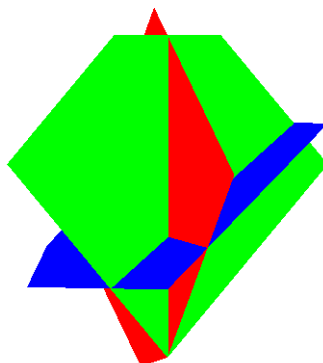


B. Soustava tří rovnic o třech neznámých

```
[ > restart;
```

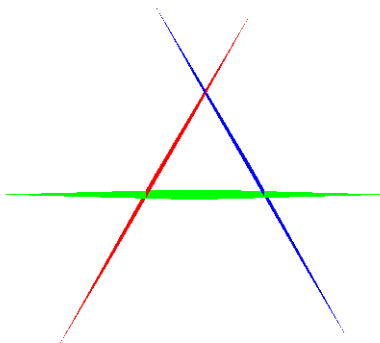
1) Právě jedno řešení

```
> p1:=2*x-y+z=2; p2:=-x+2*y-3*z=3; p3:=x+y+2*z=4;  
      p1 := 2 x - y + z = 2  
      p2 := -x + 2 y - 3 z = 3  
      p3 := x + y + 2 z = 4  
> plots[implicitplot3d]([p1,p2,p3],x=-6..6,y=-6..6,z=-6..6,color=[  
      red,blue,green],style=patchnogrid,scaling=constrained);
```



2) Žádné řešení

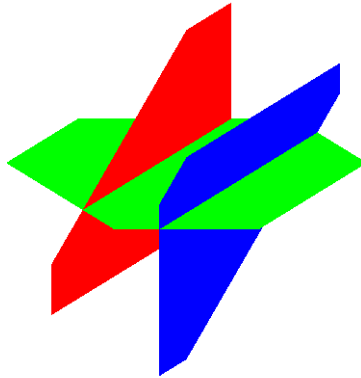
```
> q1:=2*x-y+z=5; q2:=-x+2*y+z=7; q3:=x+y+2*z=1;  
      q1 := 2 x - y + z = 5  
      q2 := -x + 2 y + z = 7  
      q3 := x + y + 2 z = 1  
> plots[implicitplot3d]([q1,q2,q3],x=-6..6,y=-6..6,z=-6..6,color=[  
      red,blue,green],style=patchnogrid,scaling=constrained,orientatio  
      n=[45,124]);
```



```

> s1:=x-y+z=5; s2:=-x+y-z=7; s3:=x+y+z=2;
      s1 := x - y + z = 5
      s2 := -x + y - z = 7
      s3 := x + y + z = 2
> plots[implicitplot3d]([s1,s2,s3],x=-10..10,y=-10..10,z=-10..10,color=[red,blue,green],style=patchnogrid,scaling=constrained,orientation=[45,124]);

```



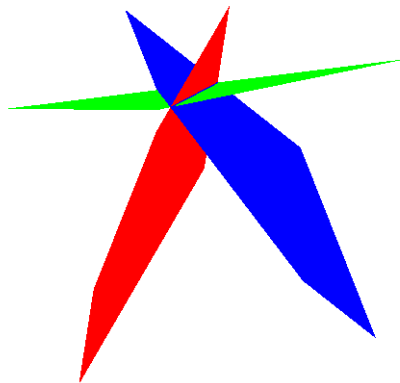
3) Nekonečně mnoho řešení

Společná přímka

```

> r1:=2*x-y+z=5; r2:=-x+2*y+z=7; r3:=x+y+2*z=12;
      r1 := 2x - y + z = 5
      r2 := -x + 2y + z = 7
      r3 := x + y + 2z = 12
> plots[implicitplot3d]([r1,r2,r3],x=-6..6,y=-6..6,z=-6..6,color=[red,blue,green],style=patchnogrid,scaling=constrained,orientation=[45,124]);

```



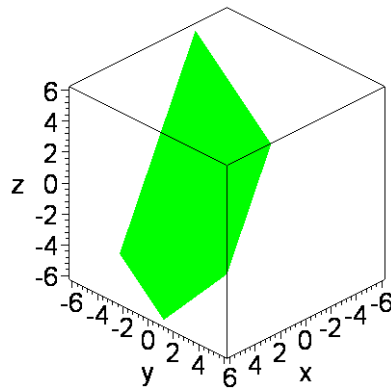
```
> r1:=2*x-y+z=5; r2:=-20*x+10*y-10*z=-50; r3:=4*x-2*y+2*z=10;
```

$$r1 := 2x - y + z = 5$$

$$r2 := -20x + 10y - 10z = -50$$

$$r3 := 4x - 2y + 2z = 10$$

```
> plots[implicitplot3d]([r1,r2,r3],x=-6..6,y=-6..6,z=-6..6,color=[  
red,blue,green],style=patchnogrid,scaling=constrained,orientatio  
n=[45,60],axes=boxed);
```



Homogenní vs. nehomogenní soustava

A. Soustava dvou rovnic o dvou neznámých

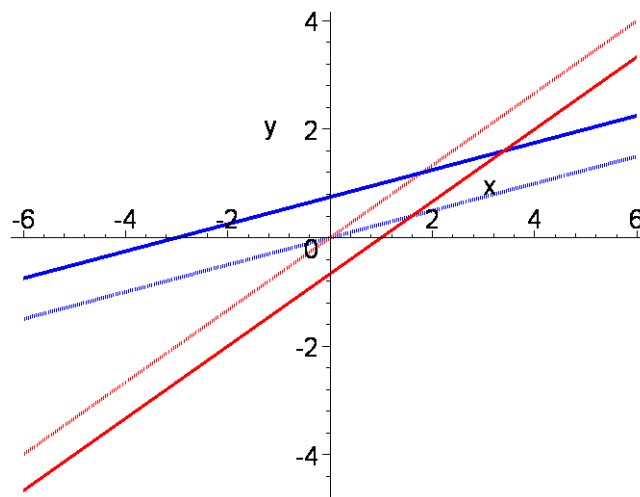
```
[ > restart;
```

Soustava (nehomogenní)

```
[ > p1:=2*x-3*y=2; p2:=-x+4*y=3;
                                     p1 := 2 x - 3 y = 2
                                     p2 := -x + 4 y = 3
```

Příslušná soustava homogenní

```
[ > p1h:=2*x-3*y=0; p2h:=-x+4*y=0;
                                     p1h := 2 x - 3 y = 0
                                     p2h := -x + 4 y = 0
> plots[implicitplot]([p1,p2,p1h,p2h],x=-6..6,y=-6..6,color=[red,b
lue,red,blue],linestyle=[solid,solid,dot,dot],thickness=4);
```



B. Soustava tří rovnic o třech neznámých

```
[ > restart;
```

Soustava (nehomogenní)

```
> r1:=2*x-y+z=5; r2:=-x+2*y+z=7; r3:=x+y+2*z=12;
```

$$r1 := 2x - y + z = 5$$

$$r2 := -x + 2y + z = 7$$

$$r3 := x + y + 2z = 12$$

Příslušná soustava homogenní

```
> r1h:=2*x-y+z=0; r2h:=-x+2*y+z=0; r3h:=x+y+2*z=0;
```

$$r1h := 2x - y + z = 0$$

$$r2h := -x + 2y + z = 0$$

$$r3h := x + y + 2z = 0$$

```
> plots[implicitplot3d]([r1,r2,r3,r1h,r2h,r3h],x=-6..6,y=-6..6,z=-6..6,color=[red,blue,green,red,blue,green],style=[patchnogrid,patchnogrid,patchnogrid,wireframe,wireframe,wireframe],scaling=constrained,orientation=[25,112],axes=normal);
```

