```
> read "DRStrelba.m":
```

Aplikační příklad 4:

Máme rovnici popisující neizotermní vnitřní difuzi v částici katalyzátoru tvaru desky

$$\frac{d^2}{dx^2}y = \phi^2\, y\, e^{\left(\frac{\alpha\beta(1-y)}{1+\beta(1-y)}\right)},\ \text{s okrajovými podmínkami :}$$

$$y(1) = 1,\ \frac{d}{dx}y(0) = 0.$$

Použijte parametry $\alpha = 1,\ \beta = 0.1,\ \phi = 1.$

▼ Řešení

Definice parametrů diferenciální rovnice
```
> alpha:=20:
  beta:=0.1:
  phi:=1:
```

Definice pravé strany diferenciální rovnice
```
> f:=unapply(y2,x,y1,y2);
  g:=unapply((phi)^(2)*y1*exp((alpha*beta*(1-y1))/(1+beta*(1-
  y1))),x,y1,y2);
```

$$f := (x, y1, y2) \rightarrow y2$$

$$g := (x, y1, y2) \rightarrow y1\, e^{\frac{2.0\,(1-y1)}{1.1-0.1\,y1}}$$ **(1.1)**

Definice parametrů metody strelba2.
```
> a := 0.0:
  b := 1.0:
  alfa1 := 0:
  alfa2 := 1:
  beta1 := 1:
  beta2 := 0:
  gama1 := 0:
  gama2 := 1:
  eps := 0.1e-5:
  m1 := 10:
  h:=(b-a)/m1:
  z0:=1.0;
  Lx := evalf([seq(a+(i-1)*h, i = 1 .. m1+1)]):
```
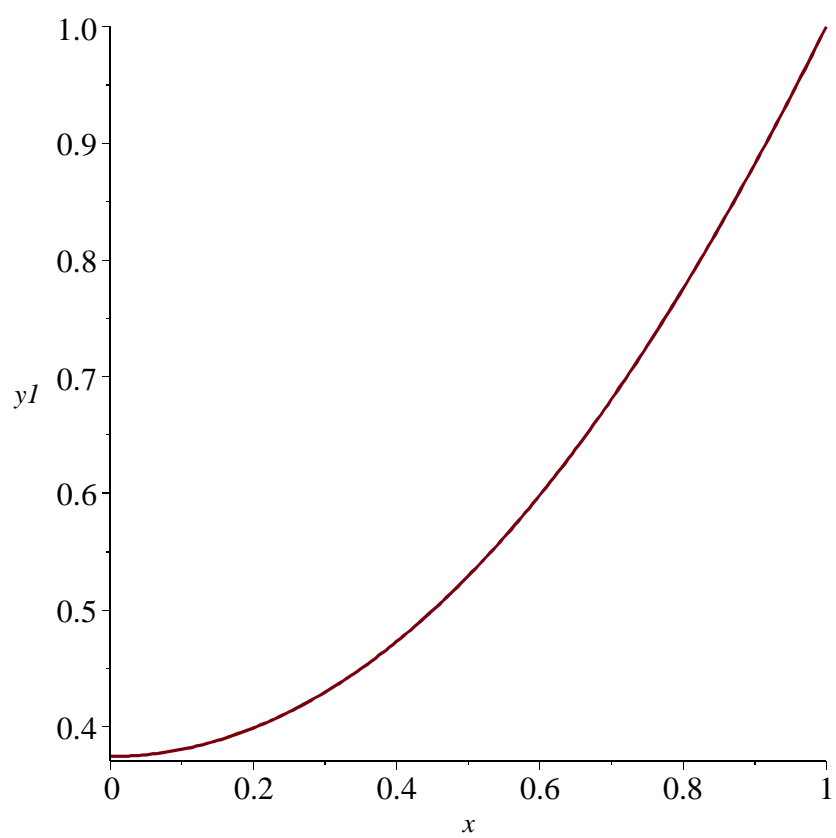
$$z0 := 1.0$$ **(1.2)**

```
> v := Strelba2(f, g, a, b, alfa1,alfa2,beta1,beta2,gama1,
  gama2, eps, z0, Lx):
iterace          zn              sn
----------------------------------------
    0      1.000000000
    1      0.147467840        0.852532160
    2      0.301445456        0.153977617
    3      0.367145069        0.065699612
    4      0.374458937        0.007313869
    5      0.374533370        0.000074433
    6      0.374533377        0.000000008
> # Graf funkce y1(x)
> v[1];
```
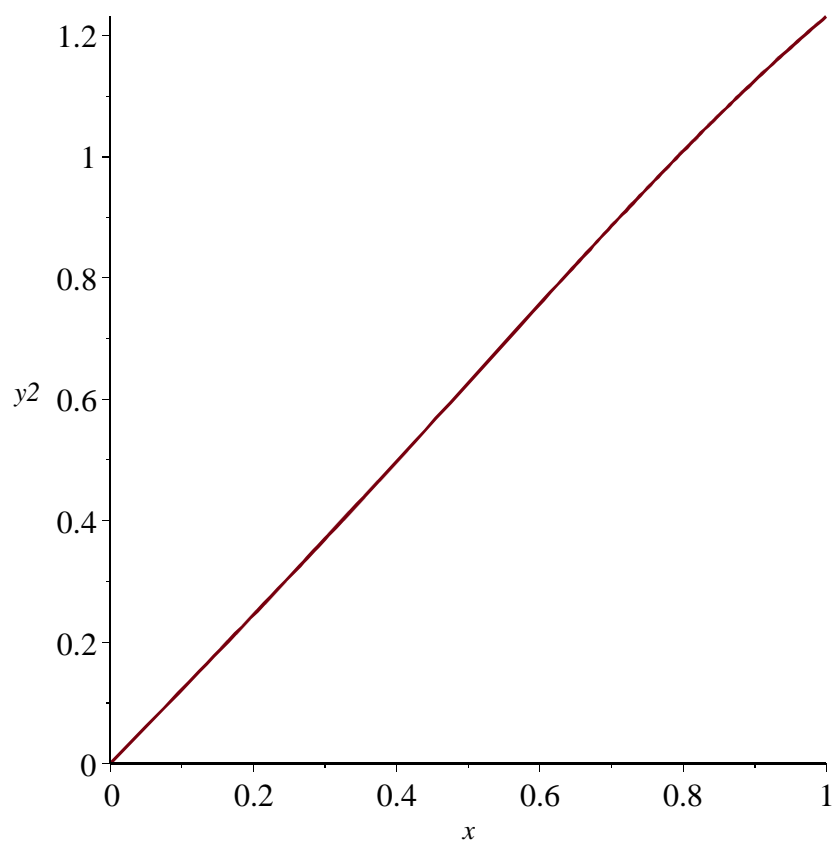
```
> # Graf funkce y2(x)
> v[2];
```

```
> linalg[matrix](v[3]);
```

$$
\begin{bmatrix}
0. & 0.374533369954873 \\
0.1000000000 & 0.380616764168513 \\
0.2000000000 & 0.398930485876006 \\
0.3000000000 & 0.429648428454763 \\
0.4000000000 & 0.473006672513646 \\
0.5000000000 & 0.529230049101196 \\
0.6000000000 & 0.598444357825397 \\
0.7000000000 & 0.680589265134935 \\
0.8000000000 & 0.775349036431933 \\
0.9000000000 & 0.882116623019930 \\
1.000000000 & 0.999999990633304
\end{bmatrix}
$$

(1.3)

```
> # Tabulka hodnot funkce y2(x)
> linalg[matrix](v[4]);
```

$$\begin{bmatrix} 0. & 0. \\ 0.1000000000 & 0.121776599144492 \\ 0.2000000000 & 0.244795825497503 \\ 0.3000000000 & 0.369969032286455 \\ 0.4000000000 & 0.497585512437783 \\ 0.5000000000 & 0.627106568080379 \\ 0.6000000000 & 0.757091003413965 \\ 0.7000000000 & 0.885287116307732 \\ 0.8000000000 & 1.00889549669885 \\ 0.9000000000 & 1.12496126764525 \\ 1.000000000 & 1.23081068310402 \end{bmatrix} \tag{1.4}$$