```
> read "DESite.m":
```

Apl. pŠíklad 1:

Izotermní vnitŠní difuze v porézním katalyzátoru je popsána diferenciální rovnicí
$y''+a/x\,y'=\varphi^2 y^n$ s okrajovou podmínkou y'(0)=0 a y(1)=1.
Parametr a charakterizuje tvar ļástice katalyzátoru a=0 pro desku, a=1pro valeļek, a=2 pro kuliļku, n je Šád reakce a ◖ Thieleho modul.
a) VyŠeģte tuto rovnici metodou sítí pro n=0, a=1 a ◖=1
b) VyŠeģte tuto rovnici metodou sítí pro n=1, a=2 a ◖=1;2;4
c) VyŠeģte tuto rovnici metodou sití pro n=1, a=0 a ◖=1;2;4

a)

Definice parametrŢ diferenciální rovnice *Lineární rovnice*

```
> n1:=0:
  aa:=1:
  phi:=1:
```

Definice pravé strany diferenciální rovnice

```
> f:=(x,y,dy)->-aa/x*dy + phi^2*y^n1 ;
```

$$f := (x, y, dy) \rightarrow -\frac{aa\,dy}{x} + \phi^2\, y^{n1} \qquad \textbf{(1.1)}$$

Definice parametrŢ metody

```
> a := 0:
  b := 1:
  alfa1 := 0:
  alfa2 := 1:
  beta1 := 1:
  beta2 := 0:
  gama1 := 0:
  gama2 := 1:
  eps := 0.1e-3:
  n := 20:
  y0:=evalf([seq(0.5,i=1..n+1)]);
  y0[1]:=1.0;
  y0[n+1]:=1.0;
```

$y0 := [0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5]$

$$y0_1 := 1.0$$

$$y0_{21} := 1.0 \qquad \textbf{(1.2)}$$

```
> yres := DESite2(n,f,a, b,alfa1,alfa2,beta1,beta2,gama1,
  gama2, eps, y0, 10):
```

"iterace = ", 0

"y = ", [0.5000000000, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 1.]

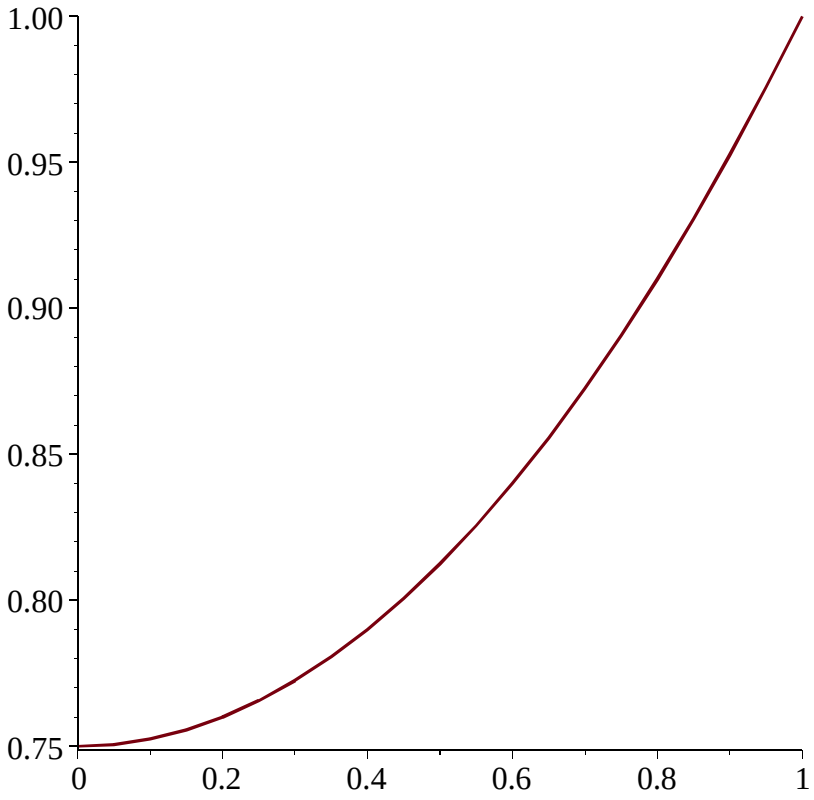
"iterace = ", 1, " s = ", 0.6112373246

"y = ", [0.7499999996, 0.7506249997, 0.7524999997, 0.7556249997, 0.7599999997, 0.7656249997, 0.7724999997, 0.7806249997, 0.7899999997, 0.8006249997, 0.8124999997, 0.8256249997, 0.8399999997, 0.8556249997, 0.8724999997, 0.8906249997, 0.9099999997, 0.9306249997, 0.9524999997, 0.9756249997, 1.]

"iterace = ", 2, " s = ", $3.501912068\ 10^{-8}$

"y = ", [0.7500000399, 0.7506250397, 0.7525000395, 0.7556250390, 0.7600000383, 0.7656250374, 0.7725000363, 0.7806250350, 0.7900000335, 0.8006250319, 0.8125000300, 0.8256250279, 0.8400000256, 0.8556250231, 0.8725000204, 0.8906250175, 0.9100000144, 0.9306250111, 0.9525000076, 0.9756250039, 1.] **(1.3)**

```
> # Graf funkce yres(x)
> plot(yres);
```




```
> # Tabulka hodnot funkce y(x)
> linalg[matrix](yres);
```

0.	0.7500000399
0.05000000000	0.7506250397
0.1000000000	0.7525000395
0.1500000000	0.7556250390
0.2000000000	0.7600000383
0.2500000000	0.7656250374
0.3000000000	0.7725000363
0.3500000000	0.7806250350
0.4000000000	0.7900000335
0.4500000000	0.8006250319
0.5000000000	0.8125000300
0.5500000000	0.8256250279
0.6000000000	0.8400000256
0.6500000000	0.8556250231
0.7000000000	0.8725000204
0.7500000000	0.8906250175
0.8000000000	0.9100000144
0.8500000000	0.9306250111
0.9000000000	0.9525000076
0.9500000000	0.9756250039
1.000000000	1.

(1.4)

b)

Definice parametrŢ diferenciální rovnice

```
> n1:=1:
  aa:=2:
  phi:=1:
```

Definice pravé strany diferenciální rovnice

```
> f:=(x,y,dy)->-aa/x*dy + phi^2*y^n1 ;
```

$$f := (x, y, dy) \rightarrow -\frac{aa\, dy}{x} + \phi^2\, y^{n1} \qquad \textbf{(2.1)}$$

Definice parametrŢ metody

```
> a := 0:
  b := 1:
  alfa1 := 0:
  alfa2 := 1:
  beta1 := 1:
  beta2 := 0:
  gama1 := 0:
  gama2 := 1:
  eps := 0.1e-5:
  n := 20:
```

```
y0:=evalf([seq(0.8,i=1..n+1)]);
y0[1]:=1.0;
y0[n+1]:=1.0;
```

$y0 := [0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8]$

$$y0_1 := 1.0$$

$$y0_{21} := 1.0 \qquad \textbf{(2.2)}$$

```
> yres := DESite2(n,f,a, b,alfa1,alfa2,beta1,beta2,gama1,
  gama2, eps, y0, 10):
```

"iterace = ", 0

"y = ", [0.7999999999, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 1.]

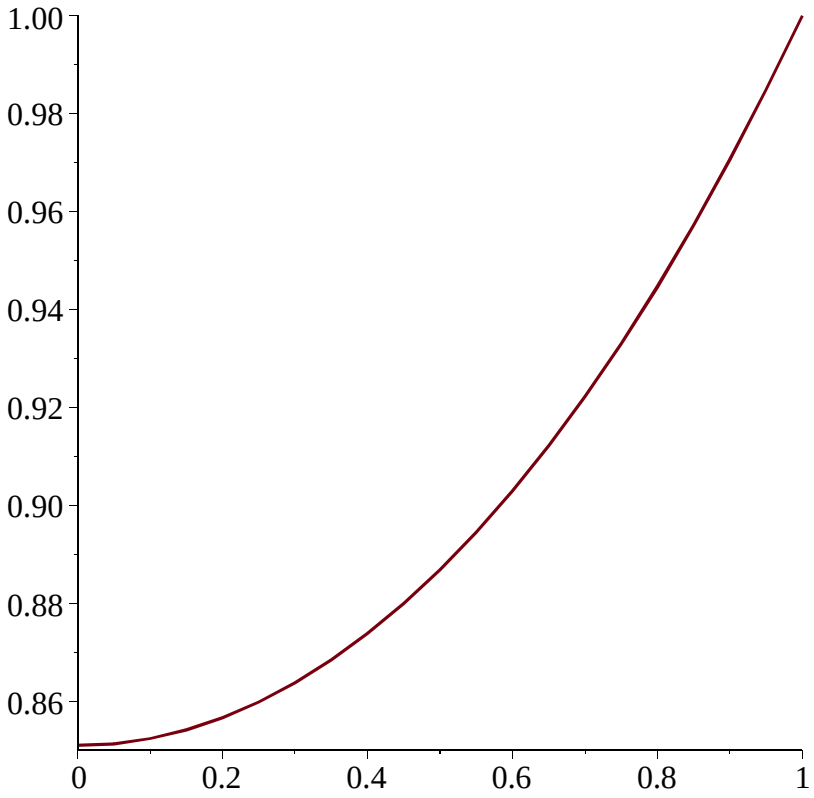
"iterace = ", 1, " s = ", 0.1260824218

"y = ", [0.8509456896, 0.8513003979, 0.8523645234, 0.8541398394, 0.8566290097, 0.8598357698, 0.8637649344, 0.8684224054, 0.8738151826, 0.8799513763, 0.8868402219, 0.8944920961, 0.9029185356, 0.9121322581, 0.9221471843, 0.9329784638, 0.9446425016, 0.9571569879, 0.9705409298, 0.9848146852, 1.]

"iterace = ", 2, " s = ", $4.234082026\ 10^{-9}$

"y = ", [0.8509456839, 0.8513003924, 0.8523645180, 0.8541398342, 0.8566290046, 0.8598357646, 0.8637649294, 0.8684224007, 0.8738151784, 0.8799513723, 0.8868402185, 0.8944920932, 0.9029185331, 0.9121322555, 0.9221471816, 0.9329784613, 0.9446424997, 0.9571569864, 0.9705409287, 0.9848146849, 1.] **(2.3)**

```
> # Graf funkce y(x)
> plot(yres);
```




```
> # Tabulka hodnot funkce y(x)
> linalg[matrix](yres);
```

(2.4)

0.	0.8509456839
0.05000000000	0.8513003924
0.1000000000	0.8523645180
0.1500000000	0.8541398342
0.2000000000	0.8566290046
0.2500000000	0.8598357646
0.3000000000	0.8637649294
0.3500000000	0.8684224007
0.4000000000	0.8738151784
0.4500000000	0.8799513723
0.5000000000	0.8868402185
0.5500000000	0.8944920932
0.6000000000	0.9029185331
0.6500000000	0.9121322555
0.7000000000	0.9221471816
0.7500000000	0.9329784613
0.8000000000	0.9446424997
0.8500000000	0.9571569864
0.9000000000	0.9705409287
0.9500000000	0.9848146849
1.000000000	1.

(2.4)

Definice parametrŢ diferenciální rovnice

```
> n1:=1:
  aa:=2:
  phi:=2:
```

Definice pravé strany diferenciální rovnice

```
> f:=(x,y,dy)->-aa/x*dy + phi^2*y^n1 ;
```

$$f := (x, y, dy) \rightarrow -\frac{aa\, dy}{x} + \phi^2\, y^{n1} \qquad \textbf{(2.5)}$$

Definice parametrŢ metody

```
> a := 0:
  b := 1:
  alfa1 := 0:
  alfa2 := 1:
  beta1 := 1:
  beta2 := 0:
  gama1 := 0:
  gama2 := 1:
  eps := 0.1e-5:
  n := 20:
  y0:=evalf([seq(0.8,i=1..n+1)]);
  y0[1]:=1.0;
  y0[n+1]:=1.0;
```

$y0 := [0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8]$

$$y0_1 := 1.0$$

$$y0_{21} := 1.0 \qquad \textbf{(2.6)}$$

```
> yres:= DESite2(n,f,a, b,alfa1,alfa2,beta1,beta2,gama1,gama2,
  eps, y0, 10):
```

"iterace = ", 0

"y = ", [0.7999999999, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 1.]

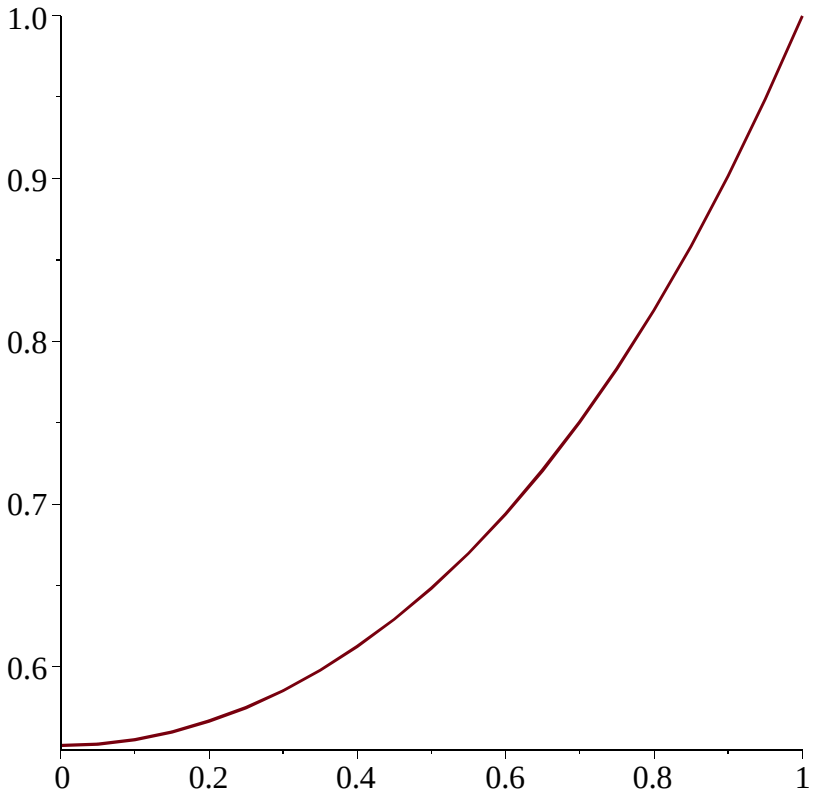
"iterace = ", 1, " s = ", 0.2073367222

"y = ", [0.5516859493, 0.5526069609, 0.5553699957, 0.5599934740, 0.5665051642, 0.5749442197, 0.5853614586, 0.5978197276, 0.6123943520, 0.6291736763, 0.6482596988, 0.6697688053, 0.6938326082, 0.7205988963, 0.7502327044, 0.7829175100, 0.8188565666, 0.8582743842, 0.9014183691, 0.9485606348, 1.]

"iterace = ", 2, " s = ", $1.709763815\ 10^{-9}$

"y = ", [0.5516859509, 0.5526069627, 0.5553699977, 0.5599934757, 0.5665051658, 0.5749442208, 0.5853614590, 0.5978197272, 0.6123943508, 0.6291736745, 0.6482596969, 0.6697688037, 0.6938326071, 0.7205988953, 0.7502327038, 0.7829175099, 0.8188565669, 0.8582743848, 0.9014183694, 0.9485606348, 1.] **(2.7)**

```
> plot(yres);
```




```
> linalg[matrix](yres);
```

0.	0.5516859509
0.05000000000	0.5526069627
0.1000000000	0.5553699977
0.1500000000	0.5599934757
0.2000000000	0.5665051658
0.2500000000	0.5749442208
0.3000000000	0.5853614590
0.3500000000	0.5978197272
0.4000000000	0.6123943508
0.4500000000	0.6291736745
0.5000000000	0.6482596969
0.5500000000	0.6697688037
0.6000000000	0.6938326071
0.6500000000	0.7205988953
0.7000000000	0.7502327038
0.7500000000	0.7829175099
0.8000000000	0.8188565669
0.8500000000	0.8582743848
0.9000000000	0.9014183694
0.9500000000	0.9485606348
1.000000000	1.

(2.8)

Definice parametrŢ diferenciální rovnice

```
> n1:=1:
  aa:=2:
  phi:=4:
```

Definice pravé strany diferenciální rovnice

```
> f:=(x,y,dy)->-aa/x*dy + phi^2*y^n1 ;
```

$$f := (x, y, dy) \rightarrow -\frac{aa\, dy}{x} + \phi^2\, y^{n1} \qquad \textbf{(2.9)}$$

Definice parametrŢ metody

```
> a := 0:
  b := 1:
  alfa1 := 0:
  alfa2 := 1:
  beta1 := 1:
  beta2 := 0:
  gama1 := 0:
  gama2 := 1:
  eps := 0.1e-5:
  n := 20:
  y0:=evalf([seq(0.8,i=1..n+1)]);
  y0[1]:=1.0;
  y0[n+1]:=1.0;
```

$y0 := [0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8]$

$$y0_1 := 1.0$$

$$y0_{21} := 1.0 \qquad \textbf{(2.10)}$$

```
> yres := DESite2(n,f,a, b,alfa1,alfa2,beta1,beta2,gama1,
  gama2, eps, y0, 10):
```

"iterace = ", 0

"y = ", [0.7999999999, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 1.]

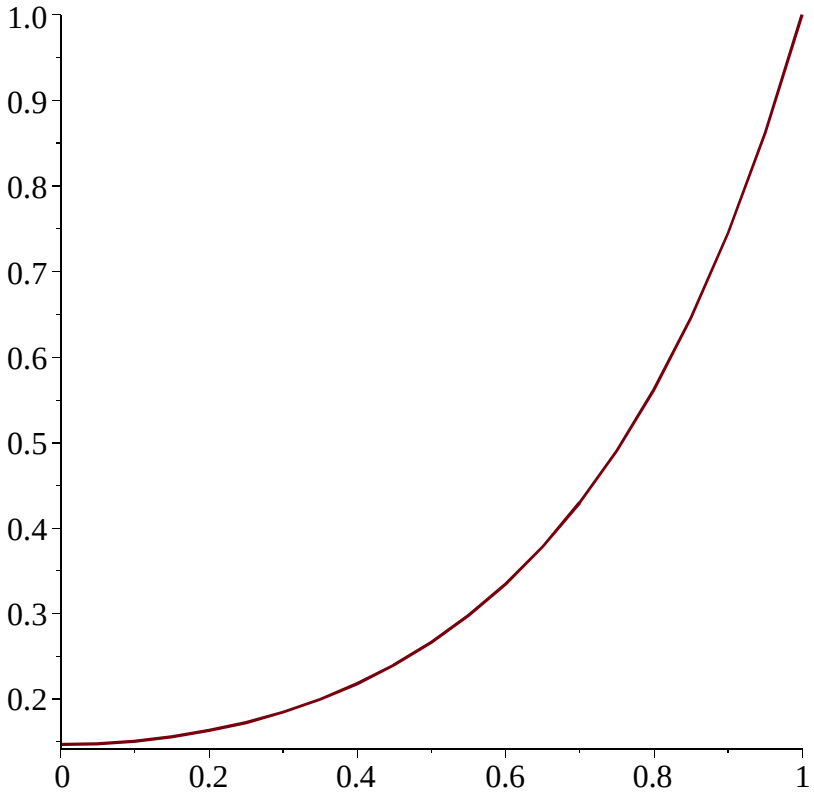
"iterace = ", 1, " s = ", 0.6094049063

"y = ", [0.1472983089, 0.1482868882, 0.1512526260, 0.1562746084, 0.1634738378, 0.1730245383, 0.1851591565, 0.2001750552, 0.2184431062, 0.2404184564, 0.2666538008, 0.2978155843, 0.3347036422, 0.3782749025, 0.4296719079, 0.4902570638, 0.5616537150, 0.6457953708, 0.7449846678, 0.8619639840, 1.]

"iterace = ", 2, " s = ", $8.689880451\ 10^{-10}$

"y = ", [0.1472983089, 0.1482868882, 0.1512526260, 0.1562746086, 0.1634738382, 0.1730245387, 0.1851591571, 0.2001750555, 0.2184431063, 0.2404184563, 0.2666538007, 0.2978155843, 0.3347036421, 0.3782749024, 0.4296719076, 0.4902570633, 0.5616537144, 0.6457953699, 0.7449846670, 0.8619639836, 1.] **(2.11)**

```
> plot(yres);
```




```
> linalg[matrix](yres);
```

0.	0.1472983089
0.05000000000	0.1482868882
0.1000000000	0.1512526260
0.1500000000	0.1562746086
0.2000000000	0.1634738382
0.2500000000	0.1730245387
0.3000000000	0.1851591571
0.3500000000	0.2001750555
0.4000000000	0.2184431063
0.4500000000	0.2404184563
0.5000000000	0.2666538007
0.5500000000	0.2978155843
0.6000000000	0.3347036421
0.6500000000	0.3782749024
0.7000000000	0.4296719076
0.7500000000	0.4902570633
0.8000000000	0.5616537144
0.8500000000	0.6457953699
0.9000000000	0.7449846670
0.9500000000	0.8619639836
1.000000000	1.

(2.12)

c)

Definice parametrŢ diferenciální rovnice

```
> n1:=1:
  aa:=0:
  phi:=1:
```

Definice pravé strany diferenciální rovnice

```
> f:=(x,y,dy)->-aa/x*dy + phi^2*y^n1 ;
```

$$f := (x, y, dy) \rightarrow -\frac{aa\ dy}{x} + \phi^2\ y^{n1} \qquad \textbf{(3.1)}$$

Definice parametrŢ metody

```
> a := 0:
  b := 1:
  alfa1 := 0:
  alfa2 := 1:
  beta1 := 1:
  beta2 := 0:
  gama1 := 0:
  gama2 := 1:
  eps := 0.1e-5:
  n := 20:
  y0:=evalf([seq(0.8,i=1..n+1)]);
  y0[1]:=1.0;
```

```
y0[n+1]:=1.0;
```

$y0 := [0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8]$

$$y0_1 := 1.0$$

$$y0_{21} := 1.0 \qquad \textbf{(3.2)}$$

```
> yres:= DESite2(n,f,a, b,alfa1,alfa2,beta1,beta2,gama1,gama2,
  eps, y0, 10):
```

"iterace = ", 0

"y = ", [0.7999999999, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 1.]

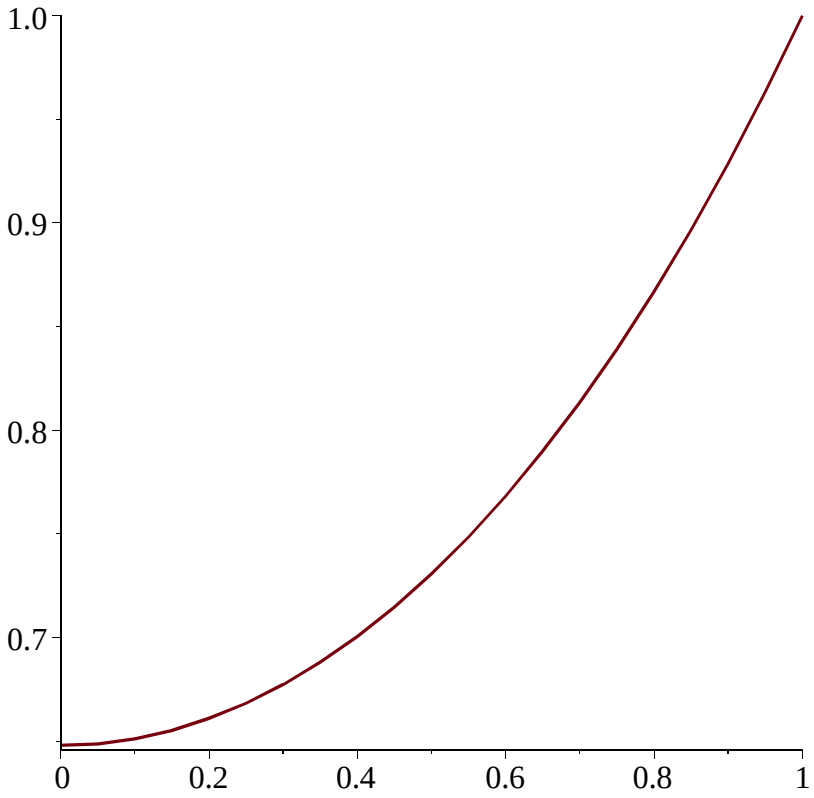
"iterace = ", 1, " s = ", 0.1311571478

"y = ", [0.6480902313, 0.6489013583, 0.6513347385, 0.6553964556, 0.6610966639, 0.6684496137, 0.6774736876, 0.6881914457, 0.7006296825, 0.7148194934, 0.7307963531, 0.7486002037, 0.7682755547, 0.7898715947, 0.8134423136, 0.8390466384, 0.8667485797, 0.8966173925, 0.9287277488, 0.9631599245, 1.]

"iterace = ", 2, " s = ", $9.016820882\ 10^{-9}$

"y = ", [0.6480902359, 0.6489013630, 0.6513347441, 0.6553964621, 0.6610966710, 0.6684496218, 0.6774736963, 0.6881914548, 0.7006296915, 0.7148195025, 0.7307963624, 0.7486002131, 0.7682755638, 0.7898716031, 0.8134423210, 0.8390466445, 0.8667485847, 0.8966173961, 0.9287277509, 0.9631599256, 1.] **(3.3)**

```
> # Graf funkce y(x)
> plot(yres);
```




```
> # Tabulka hodnot funkce y(x)
> linalg[matrix](yres);
```

(3.4)

0.	0.6480902359
0.05000000000	0.6489013630
0.1000000000	0.6513347441
0.1500000000	0.6553964621
0.2000000000	0.6610966710
0.2500000000	0.6684496218
0.3000000000	0.6774736963
0.3500000000	0.6881914548
0.4000000000	0.7006296915
0.4500000000	0.7148195025
0.5000000000	0.7307963624
0.5500000000	0.7486002131
0.6000000000	0.7682755638
0.6500000000	0.7898716031
0.7000000000	0.8134423210
0.7500000000	0.8390466445
0.8000000000	0.8667485847
0.8500000000	0.8966173961
0.9000000000	0.9287277509
0.9500000000	0.9631599256
1.000000000	1.

(3.4)

Definice parametrŢ diferenciální rovnice

```
> n1:=1:
  aa:=0:
  phi:=2:
```

Definice pravé strany diferenciální rovnice

```
> f:=(x,y,dy)->-aa/x*dy + phi^2*y^n1 ;
```

$$f := (x, y, dy) \rightarrow -\frac{aa\, dy}{x} + \phi^2\, y^{n1} \qquad \textbf{(3.5)}$$

Definice parametrŢ metody

```
> a := 0:
  b := 1:
  alfa1 := 0:
  alfa2 := 1:
  beta1 := 1:
  beta2 := 0:
  gama1 := 0:
  gama2 := 1:
  eps := 0.1e-5:
  n := 20:
  y0:=evalf([seq(0.8,i=1..n+1)]);
  y0[1]:=1.0;
  y0[n+1]:=1.0;
```

$y0 := [0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8]$

$$y0_1 := 1.0$$

$$y0_{21} := 1.0 \qquad \textbf{(3.6)}$$

```
> yres:= DESite2(n,f,a, b,alfa1,alfa2,beta1,beta2,gama1,gama2,
  eps, y0, 10):
```

"iterace = ", 0

"y = ", [0.7999999999, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 1.]

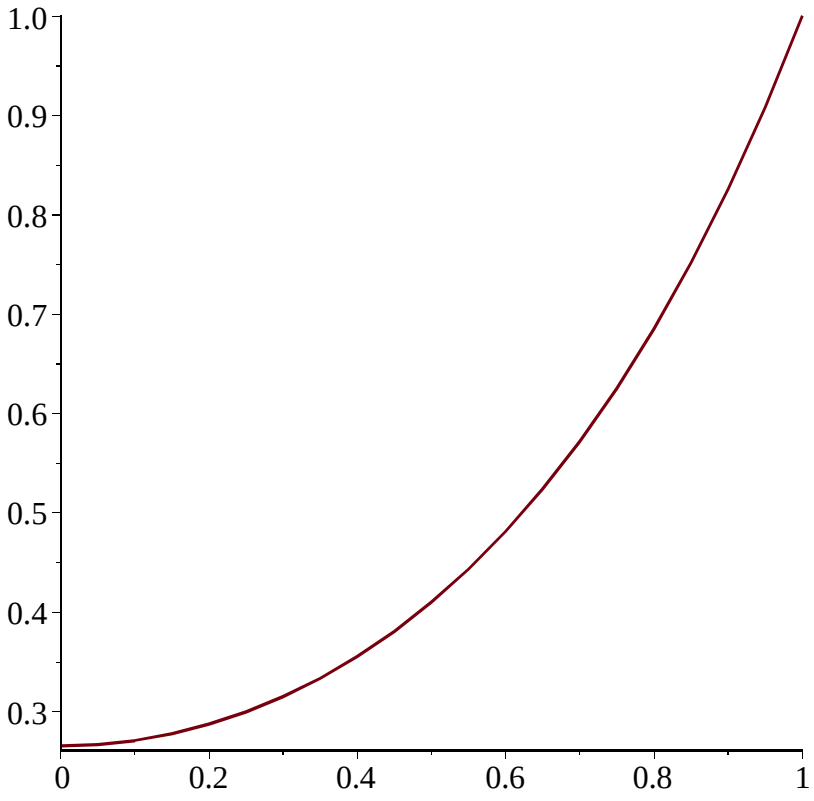
"iterace = ", 1, " s = ", 0.4682546864

"y = ", [0.2659512700, 0.2672877084, 0.2712970239, 0.2780193095, 0.2875217880, 0.2998994844, 0.3152761756, 0.3338056286, 0.3556731379, 0.3810973787, 0.4103325935, 0.4436711343, 0.4814463866, 0.5240361028, 0.5718661800, 0.6254149189, 0.6852178070, 0.7518728730, 0.8260466678, 0.9084809293, 1.]

"iterace = ", 2, " s = ", $3.066550401\ 10^{-9}$

"y = ", [0.2659512680, 0.2672877065, 0.2712970219, 0.2780193076, 0.2875217863, 0.2998994830, 0.3152761744, 0.3338056276, 0.3556731370, 0.3810973779, 0.4103325925, 0.4436711330, 0.4814463849, 0.5240361006, 0.5718661777, 0.6254149166, 0.6852178048, 0.7518728711, 0.8260466662, 0.9084809282, 1.] **(3.7)**

```
> # Graf funkce y(x)
> plot(yres);
```




```
> # Tabulka hodnot funkce y(x)
```

```
> linalg[matrix](yres);
```

0.	0.2659512680
0.05000000000	0.2672877065
0.1000000000	0.2712970219
0.1500000000	0.2780193076
0.2000000000	0.2875217863
0.2500000000	0.2998994830
0.3000000000	0.3152761744
0.3500000000	0.3338056276
0.4000000000	0.3556731370
0.4500000000	0.3810973779
0.5000000000	0.4103325925
0.5500000000	0.4436711330
0.6000000000	0.4814463849
0.6500000000	0.5240361006
0.7000000000	0.5718661777
0.7500000000	0.6254149166
0.8000000000	0.6852178048
0.8500000000	0.7518728711
0.9000000000	0.8260466662
0.9500000000	0.9084809282
1.000000000	1.

(3.8)

Definice parametrŢ diferenciální rovnice

```
> n1:=1:
  aa:=0:
  phi:=4:
```

Definice pravé strany diferenciální rovnice

```
> f:=(x,y,dy)->-aa/x*dy + phi^2*y^n1 ;
```

$$f := (x, y, dy) \rightarrow -\frac{aa\, dy}{x} + \phi^2\, y^{n1} \qquad \textbf{(3.9)}$$

Definice parametrŢ metody

```
> a := 0:
  b := 1:
  alfa1 := 0:
  alfa2 := 1:
  beta1 := 1:
  beta2 := 0:
  gama1 := 0:
  gama2 := 1:
  eps := 0.1e-5:
  n := 20:
  y0:=evalf([seq(0.8,i=1..n+1)]);
  y0[1]:=1.0;
  y0[n+1]:=1.0;
```

$y0 := [0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8,$

0.8, 0.8]

$$y0_1 := 1.0$$

$$y0_{21} := 1.0 \qquad \textbf{(3.10)}$$

```
> yres:= DESite2(n,f,a, b,alfa1,alfa2,beta1,beta2,gama1,gama2,
  eps, y0, 10):
```

"iterace = ", 0

"y = ", [0.7999999999, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 0.8, 1.]

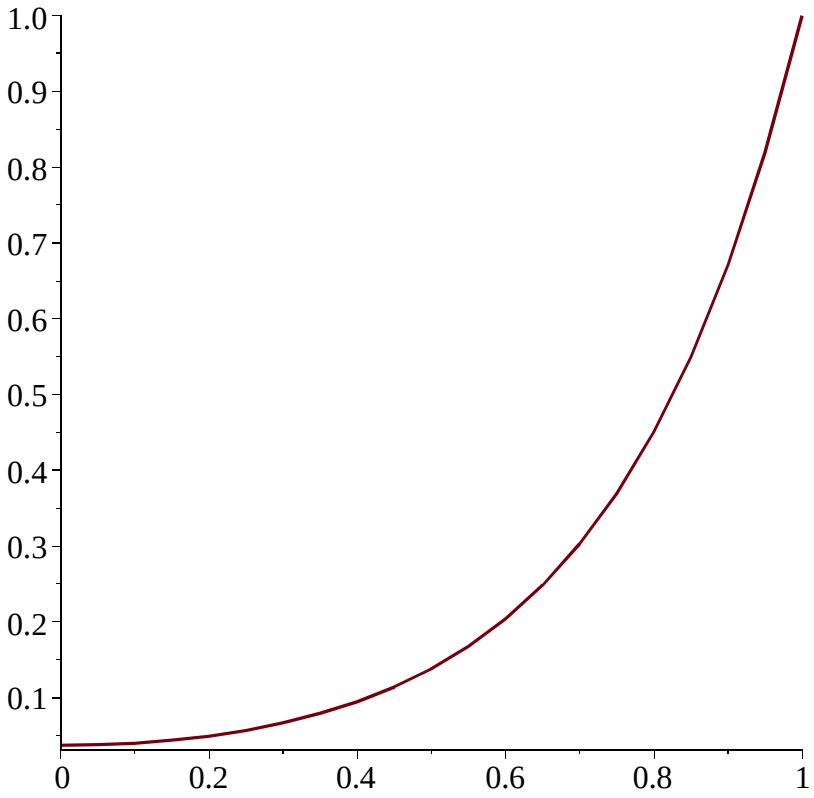
"iterace = ", 1, " s = ", 0.7414509126

"y = ", [0.03678801740, 0.0375387932, 0.0397911206, 0.0436350928, 0.0492244686, 0.0567828231, 0.0666124907, 0.0791066582, 0.0947650922, 0.1142141296, 0.1382317326, 0.1677786047, 0.2040366210, 0.2484561022, 0.3028138274, 0.3692841055, 0.4505257480, 0.5497884204, 0.6710426295, 0.8191385439, 1.]

"iterace = ", 2, " s = ", $9.712016986\ 10^{-10}$

"y = ", [0.03678801686, 0.03753879272, 0.03979112029, 0.04363509266, 0.04922446874, 0.05678282357, 0.06661249135, 0.07910665878, 0.09476509256, 0.1142141300, 0.1382317327, 0.1677786047, 0.2040366209, 0.2484561019, 0.3028138270, 0.3692841052, 0.4505257476, 0.5497884199, 0.6710426292, 0.8191385436, 1.] **(3.11)**

```
> # Graf funkce y(x)
> plot(yres);
```




```
> # Tabulka hodnot funkce y(x)
> linalg[matrix](yres);
```

(3.12)

$$\begin{bmatrix} 0. & 0.03678801686 \\ 0.05000000000 & 0.03753879272 \\ 0.1000000000 & 0.03979112029 \\ 0.1500000000 & 0.04363509266 \\ 0.2000000000 & 0.04922446874 \\ 0.2500000000 & 0.05678282357 \\ 0.3000000000 & 0.06661249135 \\ 0.3500000000 & 0.07910665878 \\ 0.4000000000 & 0.09476509256 \\ 0.4500000000 & 0.1142141300 \\ 0.5000000000 & 0.1382317327 \\ 0.5500000000 & 0.1677786047 \\ 0.6000000000 & 0.2040366209 \\ 0.6500000000 & 0.2484561019 \\ 0.7000000000 & 0.3028138270 \\ 0.7500000000 & 0.3692841052 \\ 0.8000000000 & 0.4505257476 \\ 0.8500000000 & 0.5497884199 \\ 0.9000000000 & 0.6710426292 \\ 0.9500000000 & 0.8191385436 \\ 1.000000000 & 1. \end{bmatrix} \quad \textbf{(3.12)}$$