

For $r = 1.576$

$f := x \rightarrow 1.546 \cdot (1 - x) \cdot x;$

$x \rightarrow 1.546 (1 - x) x$

(1)

$a := 0.1 :$

$pts := [0, a] :$

$print(0, a) :$

for i **from** 1 **to** 100 **do**

$a := f(a) :$

$pts := pts, [i, a] :$

$print(i, a);$

od:

$plot([pts], style = point, symbol = circle, colour = purple);$

0, 0.1

1, 0.13914

2, 0.1851799734

3, 0.2332733904

4, 0.2765127916

5, 0.3092826610

6, 0.3302671821

7, 0.3419609311

8, 0.3478865672

9, 0.3507278845

10, 0.3520517739

11, 0.3526601046

12, 0.3529378167

13, 0.3530642161

14, 0.3531216674

15, 0.3531477638

16, 0.3531596144

17, 0.3531649951

18, 0.3531674383

19, 0.3531685472

20, 0.3531690508

21, 0.3531692793

22, 0.3531693831

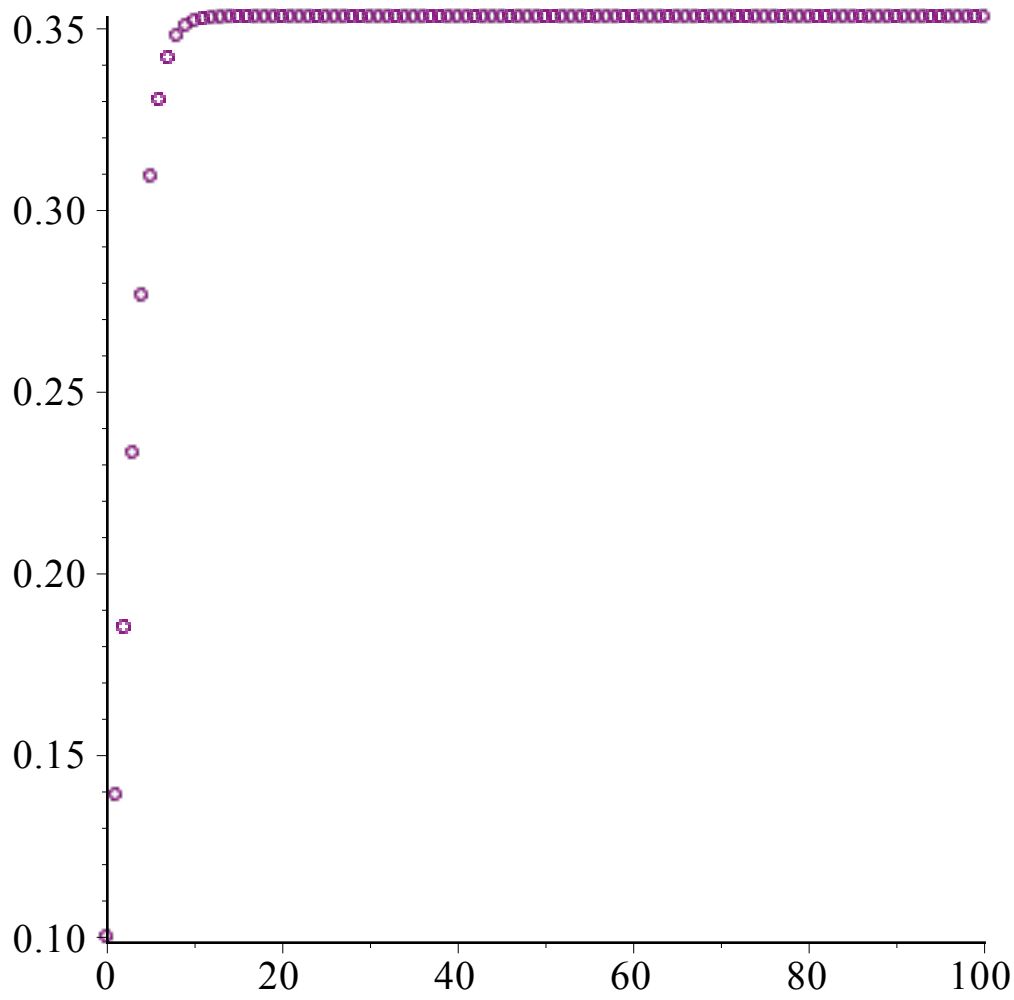
23, 0.3531694304

24, 0.3531694519

25, 0.3531694614
26, 0.3531694660
27, 0.3531694681
28, 0.3531694688
29, 0.3531694692
30, 0.3531694696
31, 0.3531694696
32, 0.3531694696
33, 0.3531694696
34, 0.3531694696
35, 0.3531694696
36, 0.3531694696
37, 0.3531694696
38, 0.3531694696
39, 0.3531694696
40, 0.3531694696
41, 0.3531694696
42, 0.3531694696
43, 0.3531694696
44, 0.3531694696
45, 0.3531694696
46, 0.3531694696
47, 0.3531694696
48, 0.3531694696
49, 0.3531694696
50, 0.3531694696
51, 0.3531694696
52, 0.3531694696
53, 0.3531694696
54, 0.3531694696
55, 0.3531694696
56, 0.3531694696
57, 0.3531694696
58, 0.3531694696

59, 0.3531694696
60, 0.3531694696
61, 0.3531694696
62, 0.3531694696
63, 0.3531694696
64, 0.3531694696
65, 0.3531694696
66, 0.3531694696
67, 0.3531694696
68, 0.3531694696
69, 0.3531694696
70, 0.3531694696
71, 0.3531694696
72, 0.3531694696
73, 0.3531694696
74, 0.3531694696
75, 0.3531694696
76, 0.3531694696
77, 0.3531694696
78, 0.3531694696
79, 0.3531694696
80, 0.3531694696
81, 0.3531694696
82, 0.3531694696
83, 0.3531694696
84, 0.3531694696
85, 0.3531694696
86, 0.3531694696
87, 0.3531694696
88, 0.3531694696
89, 0.3531694696
90, 0.3531694696
91, 0.3531694696
92, 0.3531694696

93, 0.3531694696
 94, 0.3531694696
 95, 0.3531694696
 96, 0.3531694696
 97, 0.3531694696
 98, 0.3531694696
 99, 0.3531694696
 100, 0.3531694696



$$1 - \frac{1}{1.576};$$

0.3654822335

(2)

$$1 - \frac{1}{\left(\frac{1576}{1000}\right)};$$

$$\frac{72}{197}$$

(3)

evalf(%);

0.3654822335025380710659898477157360406091370558375634517766497461928934010152\ (4)

284263959390862944162436548223350253807106598984771573604060913705583756345\
177664974619289340101522842639593908629441624365482233502538071065989847715\
736040609137055837563451776649746192893401015228426395939086294416243654822\
335025380710659898477157360406091370558375634517766497461928934010152284263\
959390862944162436548223350253807106598984771573604060913705583756345177664\
974619289340101522842639593908629441624365482233502538071065989847715736040\
609137055837563451776649746192893401015228426395939086294416243654822335025\
380710659898477157360406091370558375634517766497461928934010152284263959390\
862944162436548223350253807106598984771573604060913705583756345177664974619\
289340101522842639593908629441624365482233502538071065989847715736040609137\
055837563451776649746192893401015228426395939086294416243654822335025380710\
659898477157360406091370558375634517766497461928934010152284263959390862944\
162436548223350253807107

Digits := 1000 :

For $r = 2.75$

$f := x \rightarrow 2.75 \cdot (1 - x) \cdot x;$

$x \rightarrow 2.75 (1 - x) x$

(5)

$a := 0.1 :$

with(*plots*) :

$pts := [0, a] :$

print(0, a) :

for i **from** 1 **to** 100 **do**

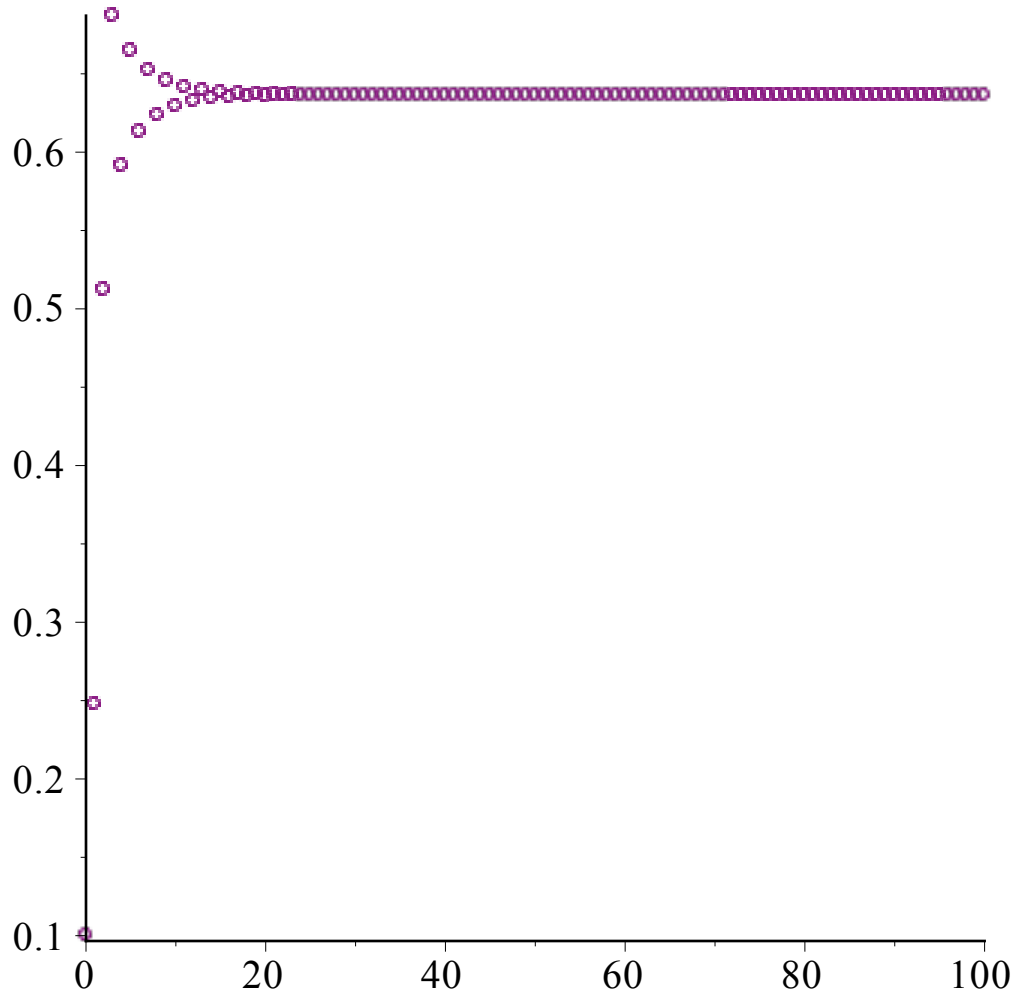
$a := f(a) :$

$pts := pts, [i, a] :$

od:

plot([pts], *style* = *point*, *symbol* = *circle*, *colour* = *purple*);

0, 0.1



Digits := 10 :

$$1 - \frac{1}{2.75};$$

0.6363636364

(6)

For $r = 3.525$

$$f := x \rightarrow 3.525 \cdot (1 - x) \cdot x;$$

$$x \rightarrow 3.525 (1 - x) x$$

(7)

$a := 0.1 :$

$pts := [0, a] :$

$print(0, a) :$

for i **from** 1 **to** 100 **do**

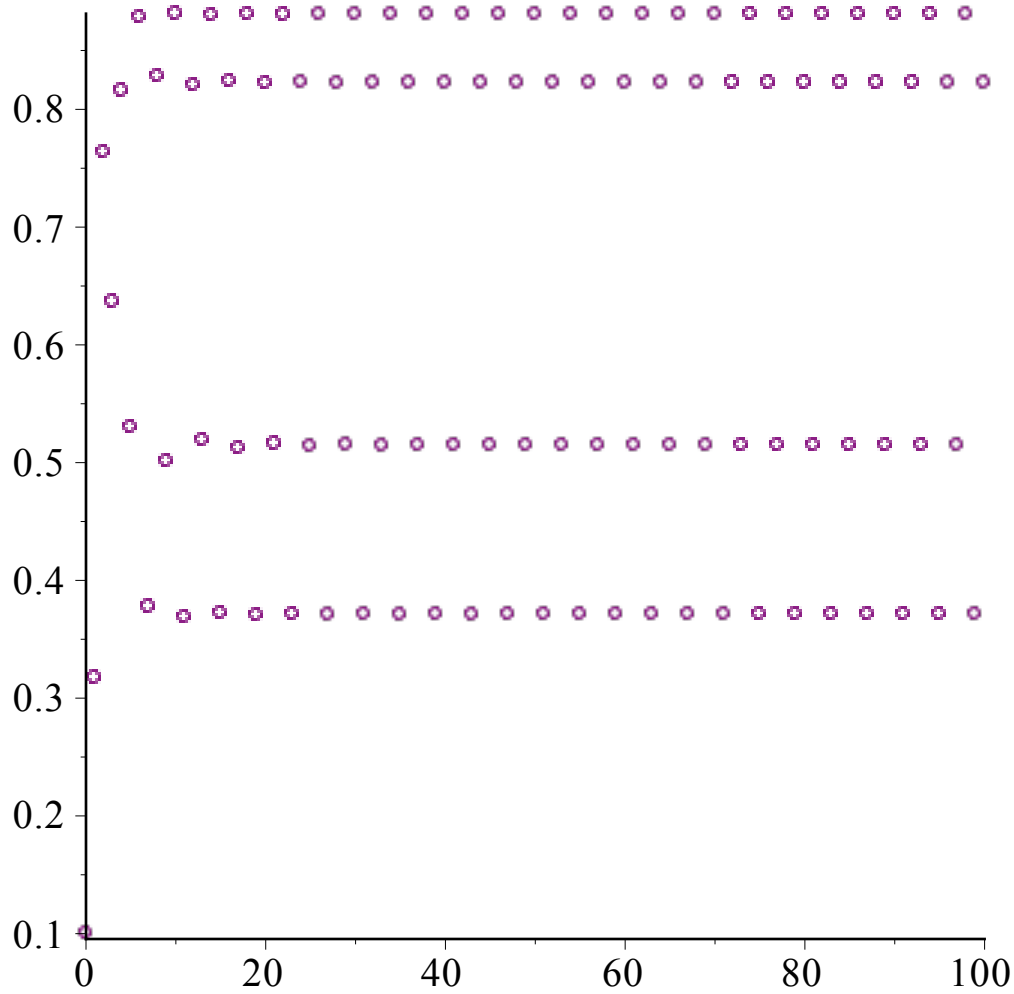
$a := f(a) :$

$pts := pts, [i, a] :$

od:

$plot([pts], style = point, symbol = circle, colour = purple);$

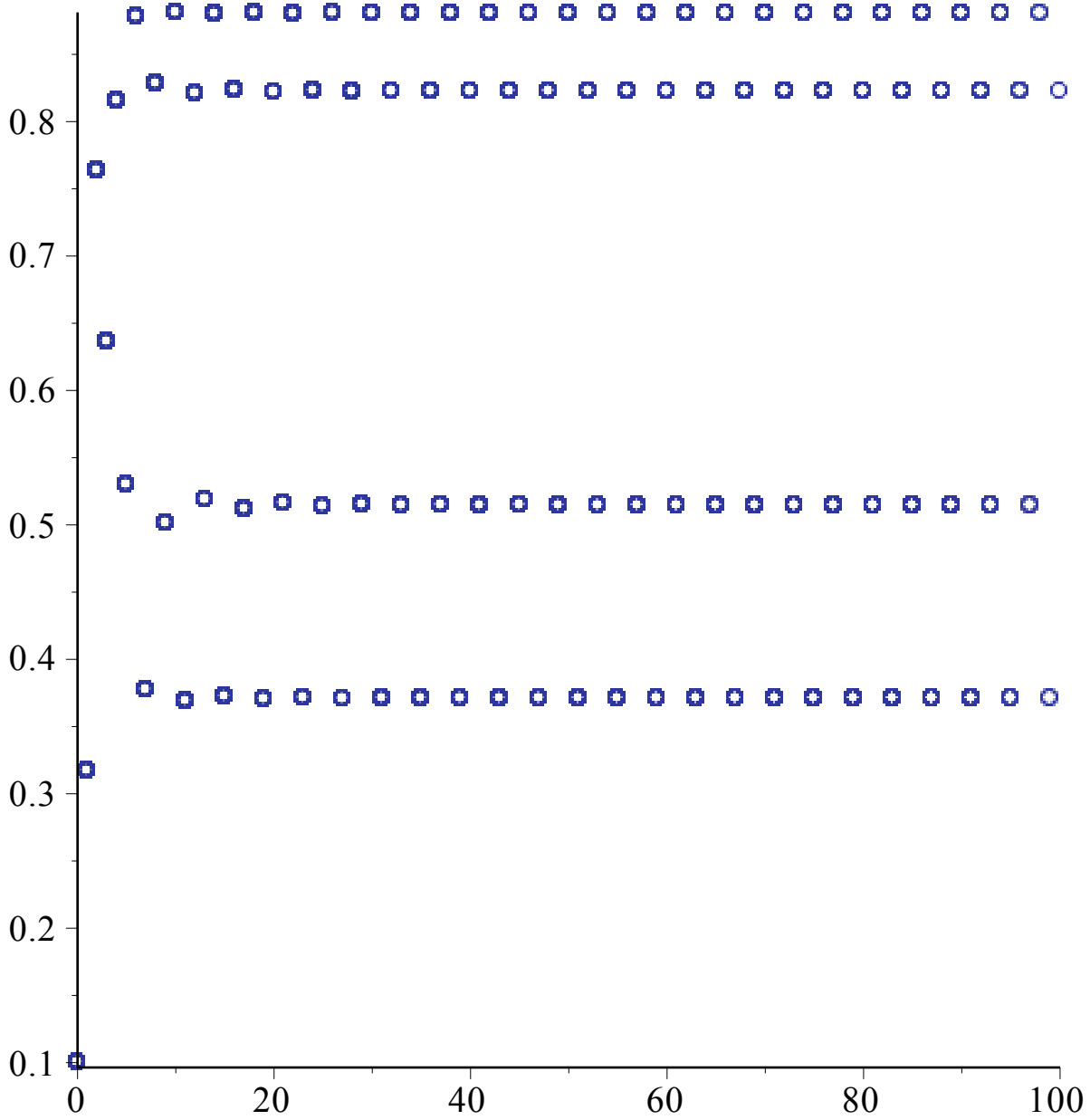
0, 0.1



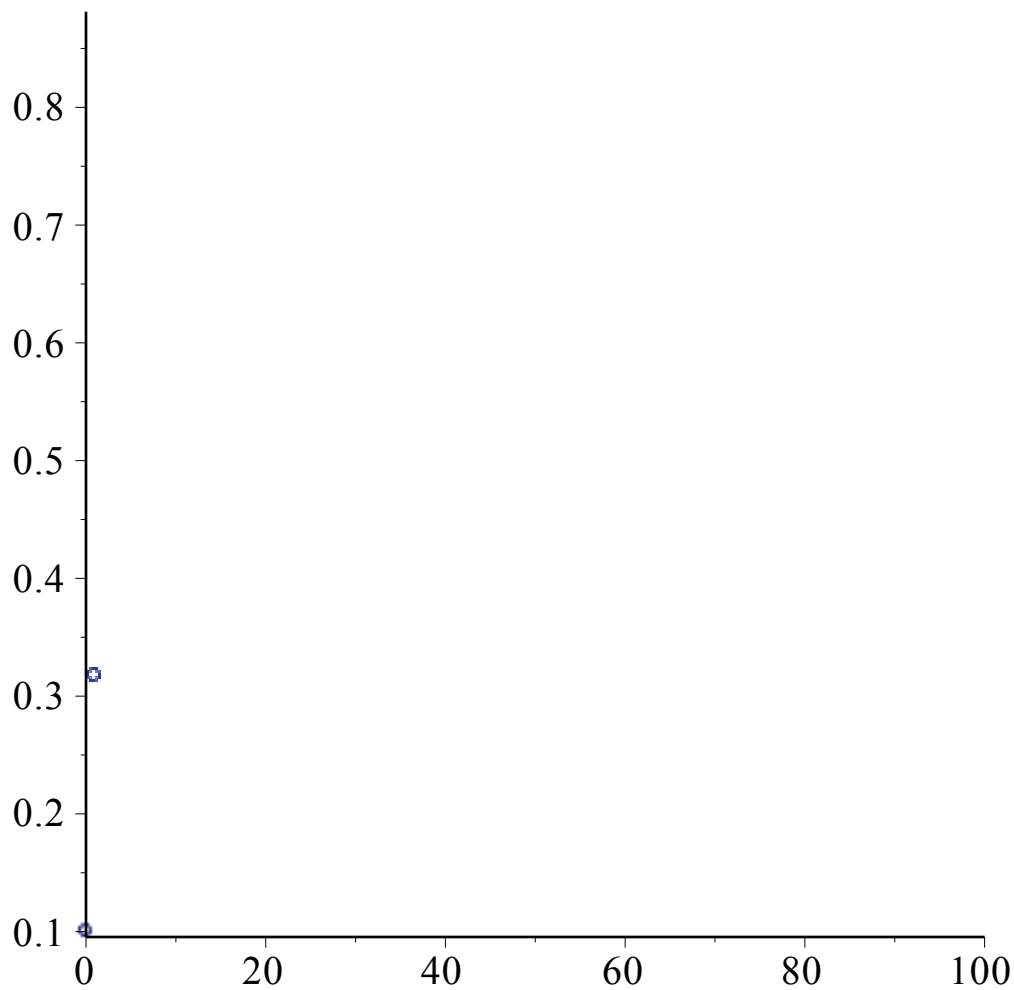
```

with(plots) :
plts := NULL :
a := 0.1 :
pts := [0, a] :
for i from 1 to 100 do
  a := f(a) :
  pts := pts, [i, a] :
  plts := plts, plot([pts], symbol = circle, style = point, colour = navy) :
od :
plts := [plts] :
display(plts, insequence = false);

```



```
display(plts, insequence = true);
```



For $r = 3.555$

$f := x \rightarrow 3.555 \cdot (1 - x) \cdot x;$

$x \rightarrow 3.555 (1 - x) x$

(8)

$plts := NULL :$

$a := 0.1 :$

$pts := [0, a] :$

for i from 1 to 100 do

$a := f(a) :$

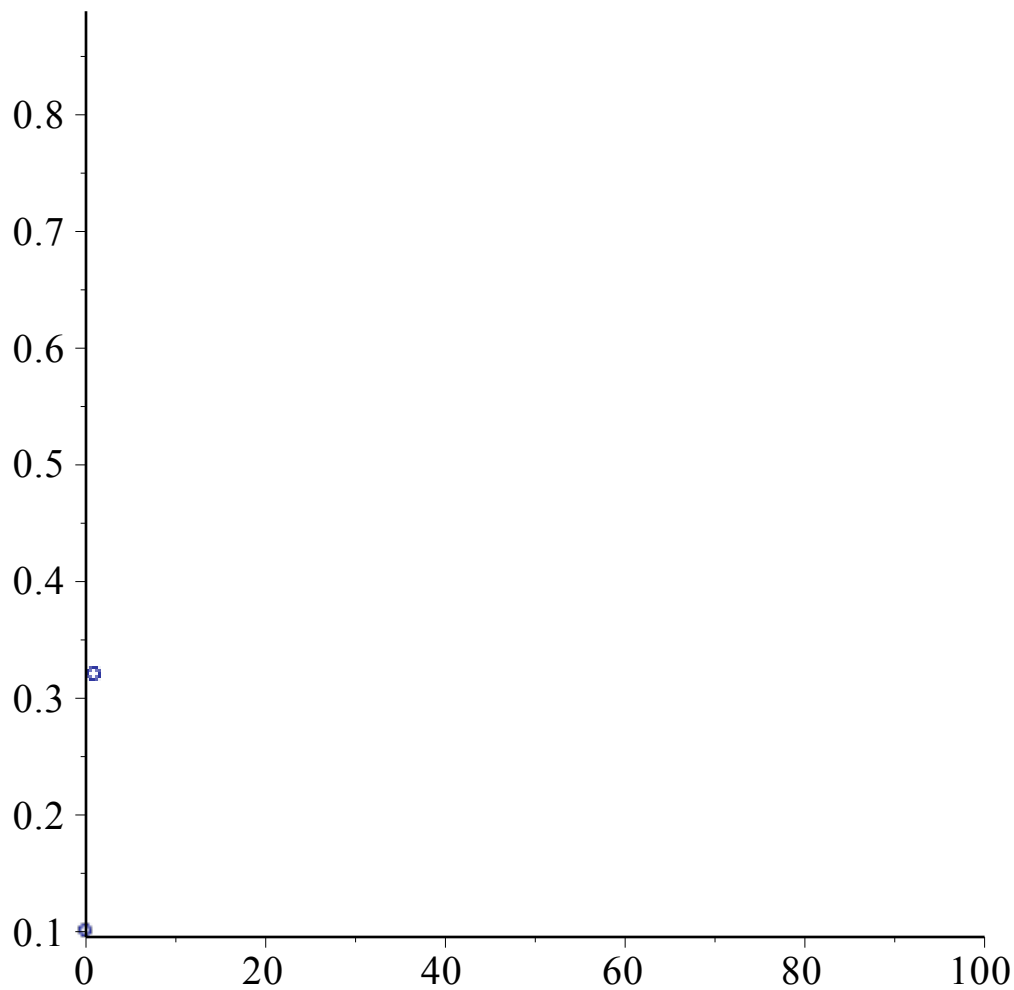
$pts := pts, [i, a] :$

$plts := plts, plot([pts], symbol = circle, style = point, colour = navy) :$

od:

$plts := [plts] :$

$display(plts, insequence = true);$



For $r = 3.750$

$f := x \rightarrow 3.750 \cdot (1 - x) \cdot x;$

$x \rightarrow 3.750 (1 - x) x$

(9)

plts := NULL :

a := 0.1 :

pts := [0, a] :

for i from 1 to 100 do

a := f(a) :

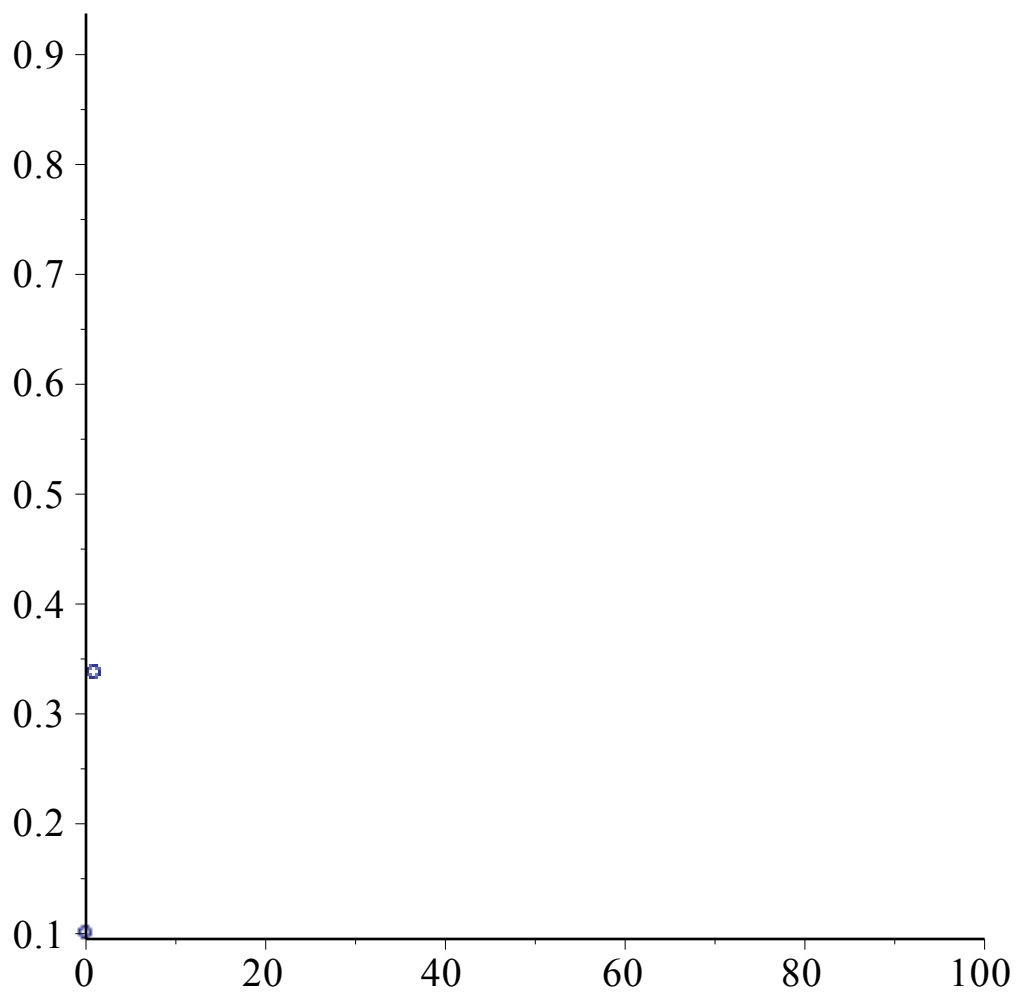
pts := pts, [i, a] :

plts := plts, plot([pts], symbol = circle, style = point, colour = navy) :

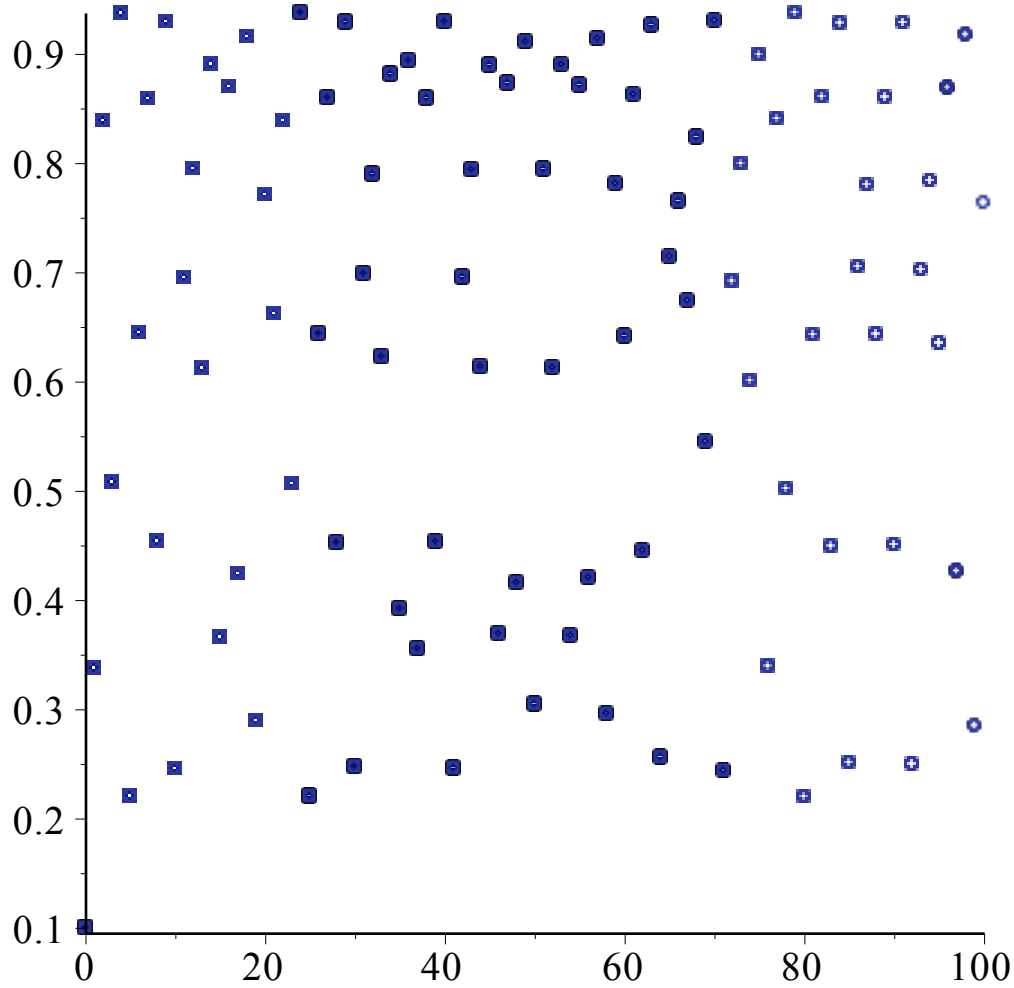
od:

plts := [plts] :

display(plts, insequence = true);



display(plts, insequence = false);



$$equilibrium := 1 - \frac{1}{3.75};$$

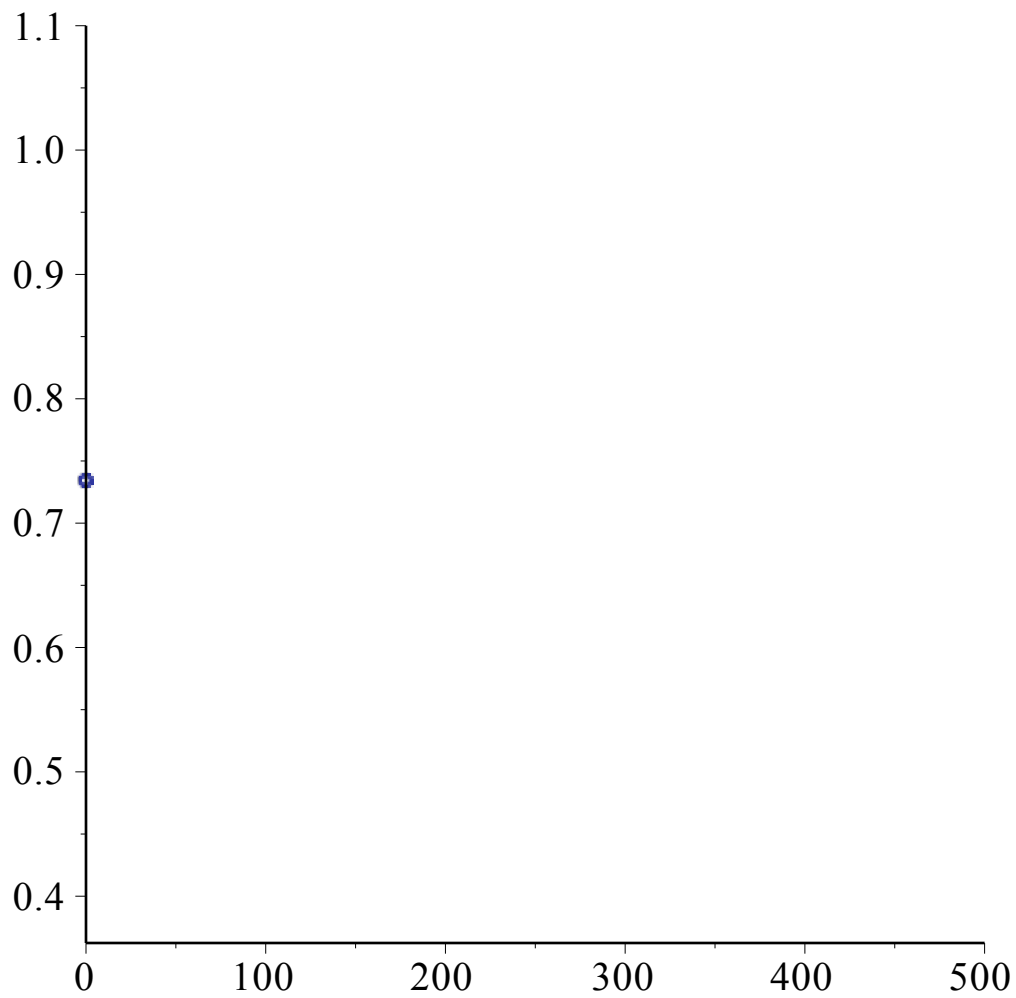
0.7333333333

(10)

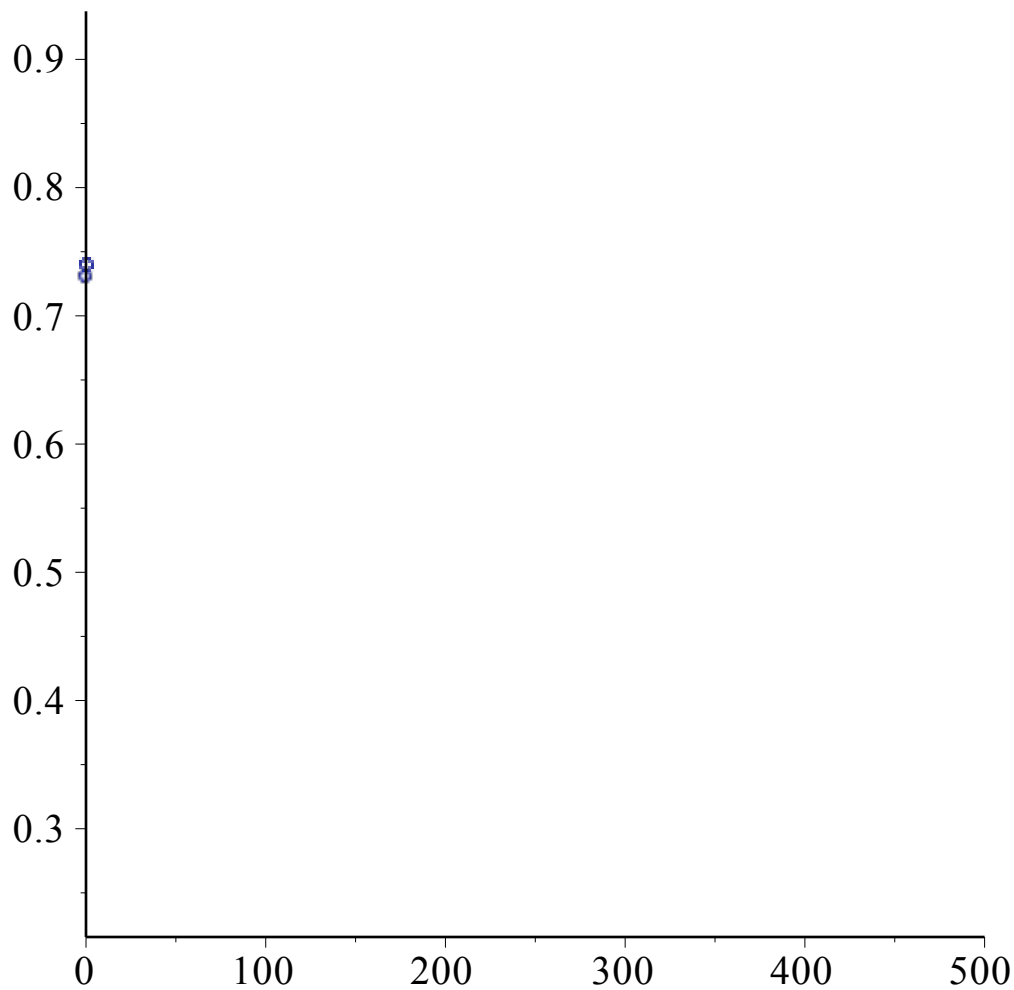
```

pts := NULL :
a := equilibrium :
pts := [0, a] :
for i from 1 to 500 do
  a := f(a) :
  pts := pts, [i, a] :
  plts := plts, plot([pts], symbol = circle, style = point, colour = navy) :
od :
plts := [plts] :
display(plts, insequence = true);

```



```
plts := NULL :  
  a := 0.73 :  
  pts := [0, a] :  
  for i from 1 to 500 do  
    a := f(a) :  
    pts := pts, [i, a] :  
    plts := plts, plot([pts], symbol = circle, style = point, colour = navy) :  
  od :  
  plts := [plts] :  
  display(plts, insequence = true);
```



Systems of Difference Equations

```
ofunction := (x, y) → 0.6 · x + 0.3 · y;
tfunction := (x, y) → 0.4 · x + 0.7 · y;
```

$$(x, y) \rightarrow 0.6x + 0.3y$$

$$(x, y) \rightarrow 0.4x + 0.7y$$

(11)

```
tfunction(10, 50);
```

39.0

(12)

```
Orlando := 10 :
Tampa := 50 :
pts := [0, 10, 50];
for i from 1 to 30 do
  temporaryOrlando := ofunction(Orlando, Tampa) :
  Tampa := tfunction(Orlando, Tampa) :
  Orlando := temporaryOrlando :
  pts := pts, [i, Orlando, Tampa] :
  print([i, Orlando, Tampa]);
od:
pts := [pts] :
```

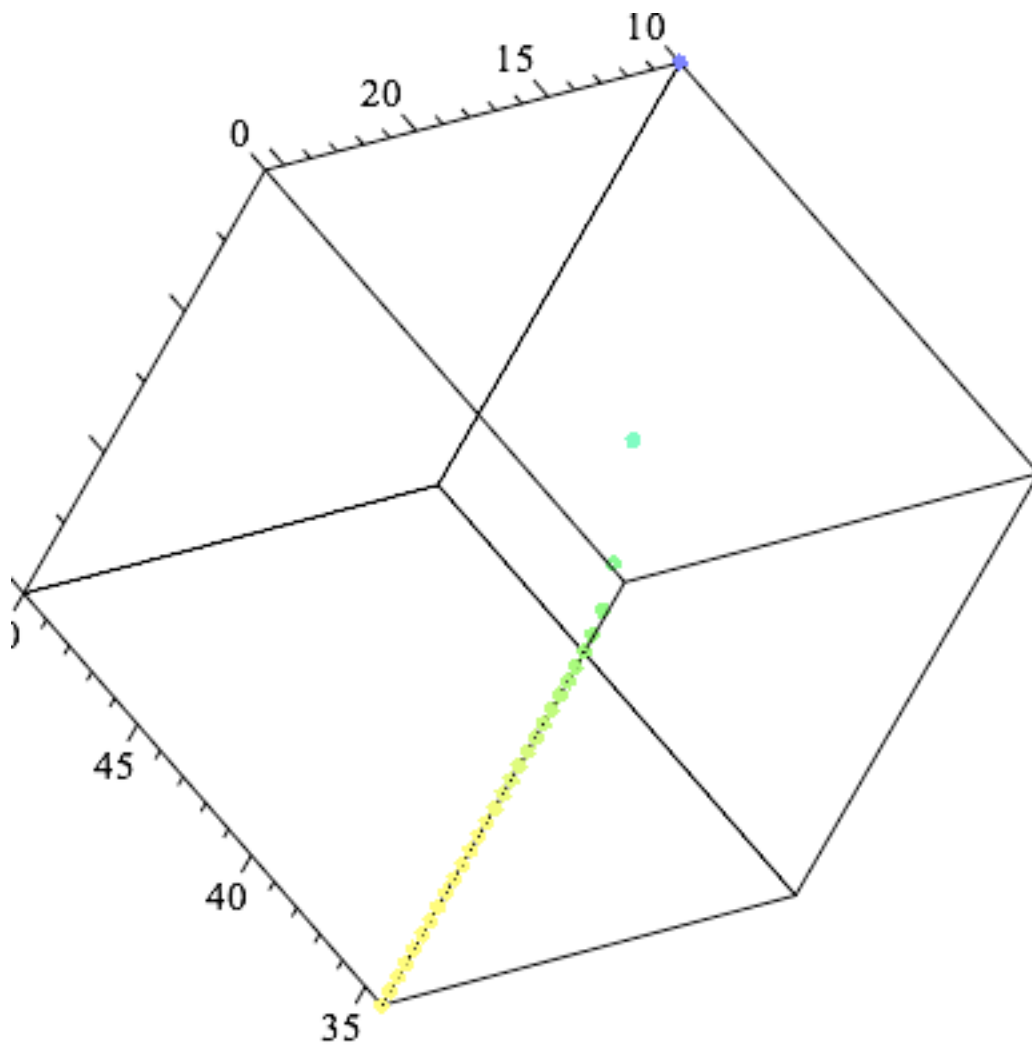
```

[0, 10, 50]
[1, 21.0, 39.0]
[2, 24.30, 35.70]
[3, 25.290, 34.710]
[4, 25.5870, 34.4130]
[5, 25.67610, 34.32390]
[6, 25.702830, 34.297170]
[7, 25.7108490, 34.2891510]
[8, 25.71325470, 34.28674530]
[9, 25.71397641, 34.28602359]
[10, 25.71419293, 34.28580707]
[11, 25.71425788, 34.28574212]
[12, 25.71427737, 34.28572263]
[13, 25.71428321, 34.28571679]
[14, 25.71428497, 34.28571503]
[15, 25.71428549, 34.28571451]
[16, 25.71428564, 34.28571436]
[17, 25.71428569, 34.28571431]
[18, 25.71428570, 34.28571430]
[19, 25.71428571, 34.28571429]
[20, 25.71428572, 34.28571428]
[21, 25.71428571, 34.28571429]
[22, 25.71428572, 34.28571428]
[23, 25.71428571, 34.28571429]
[24, 25.71428572, 34.28571428]
[25, 25.71428571, 34.28571429]
[26, 25.71428572, 34.28571428]
[27, 25.71428571, 34.28571429]
[28, 25.71428572, 34.28571428]
[29, 25.71428571, 34.28571429]
[30, 25.71428572, 34.28571428]

```

(13)

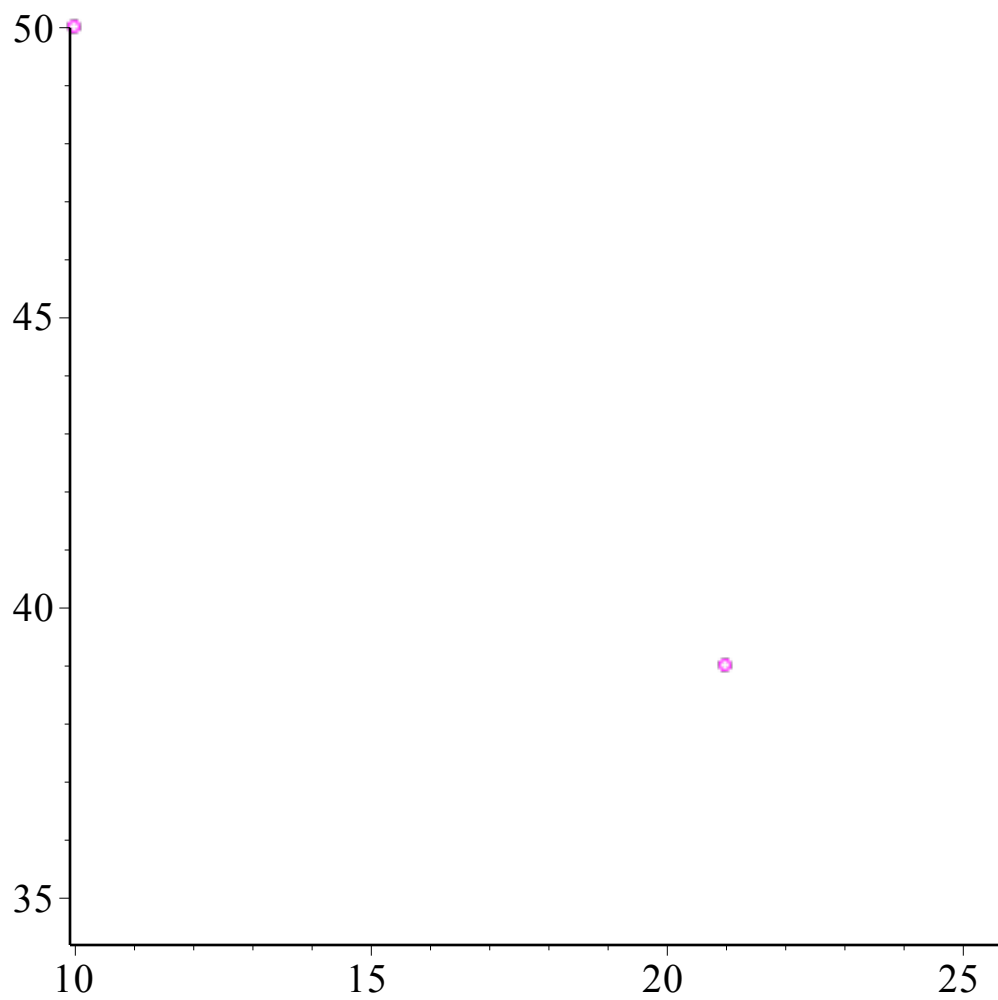
```
plot3d(pts, symbol = circle, style = point);
```



```

Orlando := 10 :
Tampa := 50 :
pts := [10, 50] :
plts := NULL :
for i from 1 to 30 do
    temporaryOrlando := ofunction(Orlando, Tampa) :
    Tampa := tfunction(Orlando, Tampa) :
    Orlando := temporaryOrlando :
    pts := pts, [Orlando, Tampa] :
    plts := plts, plot([pts], symbol = circle, style = point, colour = magenta) :
od :
plts := [plts] :
display(plts, insequence = true);
pts := [pts] :

```



$$\frac{240.}{7};$$

$$34.28571429 \quad (14)$$

$$60 - \%;$$

$$25.71428571 \quad (15)$$