

```

> #1
> T:=RT([x],10);SSSg(T,[x]); SSg(T,[x],z);ORB(T,[x],[6.],1000,1010)
[-1];

```

$$T := \left[\frac{7 + 10x}{6 + 2x} \right]$$

$$\{[3.121320343]\}$$

$$[[-1.121320343], [3.121320343]]$$

$$[3.121320342]$$

(1)

```

> #1
for i from 0 to 20 do
  T:=RT([x],10);ss:=SSSg(T,[x]); SSg(T,[x],z);o:=ORB(T,[x],[6.],
1000,1010)[-1];
  if op(ss) = o then print(`they match!`) end
end

```

$$T := \left[\frac{5 + 6x}{3 + 7x} \right]$$

$$ss := \{ [1.086182544] \}$$

$$[[-0.6576111157], [1.086182544]]$$

$$o := [1.086182544]$$

they match!

$$T := \left[\frac{10 + 9x}{3 + 5x} \right]$$

$$ss := \{ [2.136229150] \}$$

$$[[-0.9362291500], [2.136229150]]$$

$$o := [2.136229150]$$

they match!

$$T := \left[\frac{8 + 10x}{6 + 10x} \right]$$

$$ss := \{ [1.116515139] \}$$

$$[[-0.7165151390], [1.116515139]]$$

$$o := [1.116515139]$$

they match!

$$T := \left[\frac{9 + 6x}{4 + 4x} \right]$$

$$ss := \{ [1.770690632] \}$$

$$[[-1.270690632], [1.770690632]]$$

$$o := [1.770690634]$$

$$T := \left[\frac{5 + 2x}{3 + 2x} \right]$$

$$ss := \{ [1.350781059] \}$$

$$[[-1.850781059], [1.350781059]]$$

$$o := [1.350781059]$$

they match!

$$T := \left[\frac{3 + 6x}{3 + 5x} \right]$$

$$ss := \{ [1.130662386] \}$$

$$[[-0.5306623863], [1.130662386]]$$

$$o := [1.130662386]$$

they match!

$$T := \left[\frac{3 + x}{4 + 6x} \right]$$

$$ss := \{[0.5000000000]\}$$

$$[[-1.], [0.5000000000]]$$

$$o := [0.5000000001]$$

$$T := \left[\frac{4 + 7x}{3 + 8x} \right]$$

$$ss := \{[1.]\}$$

$$[[-0.5000000000], [1.]]$$

$$o := [1.0000000000]$$

$$T := \left[\frac{7 + 2x}{7 + 7x} \right]$$

$$ss := \{[0.7047191969]\}$$

$$[[-1.419004911], [0.7047191969]]$$

$$o := [0.7047191959]$$

$$T := \left[\frac{5 + 8x}{2 + 8x} \right]$$

$$ss := \{[1.2500000000]\}$$

$$[[-0.5000000000], [1.2500000000]]$$

$$o := [1.2500000000]$$

they match!

$$T := \left[\frac{4 + x}{2 + 10x} \right]$$

$$ss := \{[0.5844288770]\}$$

$$[[-0.6844288770], [0.5844288770]]$$

$$o := [0.5844288770]$$

they match!

$$T := \left[\frac{8 + x}{8 + 4x} \right]$$

$$ss := \{[0.7880168380]\}$$

$$[[-2.538016838], [0.7880168380]]$$

$$o := [0.7880168368]$$

$$T := \left[\frac{7x + 9}{10 + 6x} \right]$$

$$ss := \{[1.]\}$$

$$[[-1.500000000], [1.]]$$

$$o := [1.000000000]$$

$$T := \left[\frac{3 + 6x}{7 + 10x} \right]$$

$$ss := \{[0.500000000]\}$$

$$[[-0.600000000], [0.500000000]]$$

$$o := [0.500000001]$$

$$T := \left[\frac{4 + 4x}{9 + x} \right]$$

$$ss := \{[0.701562118]\}$$

$$[[-5.701562118], [0.701562118]]$$

$$o := [0.7015621187]$$

$$T := \left[\frac{6 + 9x}{6 + 8x} \right]$$

$$ss := \{[1.073590430]\}$$

$$[[-0.698590430], [1.073590430]]$$

$$o := [1.073590430]$$

they match!

$$T := \left[\frac{5 + 5x}{7 + 9x} \right]$$

$$ss := \{[0.6424811092]\}$$

$$[[-0.8647033314], [0.6424811092]]$$

$$o := [0.6424811090]$$

$$T := \left[\frac{6 + 10x}{4 + 8x} \right]$$

$$ss := \{[1.318729304]\}$$

$$[[-0.5687293044], [1.318729304]]$$

$$o := [1.318729304]$$

they match!

$$T := \left[\frac{10 + 4x}{7 + 5x} \right]$$

$$\begin{aligned}
ss &:= \{[1.145683229]\} \\
&[[-1.745683229], [1.145683229]] \\
o &:= [1.145683230] \\
T &:= \left[\frac{6 + 4x}{5 + 5x} \right] \\
ss &:= \{[1.]\} \\
&[[-1.200000000], [1.]] \\
o &:= [1.000000000] \\
T &:= \left[\frac{8 + 3x}{4 + 7x} \right] \\
ss &:= \{[1.]\} \\
&[[-1.142857143], [1.]] \\
o &:= [1.000000000]
\end{aligned}$$

(2)

> `they tend to only be off by a little bit (~1\*10^-10)`

*they tend to only be off by a little bit (~1*10^-10)*

(3)

> T:=RT([x,y],10);SSg(T,[x,y]); SSSg(T,[x,y]);ORB(T,[x,y],[6.,8.],
1000,1010)[-1];

$$\begin{aligned}
T &:= \left[\frac{10 + 9x + 4y}{2 + 8x + 2y}, \frac{2 + 7x + 9y}{6 + 7x + 7y} \right] \\
&[[1.669021452, 0.9092895527]] \\
&\{[1.669021452, 0.9092895527]\} \\
&[1.669021450, 0.9092895525]
\end{aligned}$$

(4)

> #2
for i from 0 to 20 do
 T:=RT([x,y],10);s := SSg(T,[x,y]); SSSg(T,[x,y]);o:=ORB(T,[x,
y],[6.,8.],1000,1010)[-1];
 if s[1] = g then print(`they match`) end
end

$$T := \left[\frac{4 + x + 2y}{2 + 2x + 9y}, \frac{5 + 6x + 9y}{8 + 5x + 5y} \right]$$

$$s := [[0.514413780, 1.124202703]]$$

$$\{[0.514413780, 1.124202703]\}$$

$$o := [0.5144138024, 1.124202703]$$

$$T := \left[\frac{4 + x + 3y}{4 + 6x + 9y}, \frac{4 + 2x + 9y}{3 + 8x + 2y} \right]$$

$$s := [[0.414465793, 2.363640019]]$$

$$\{[0.414465793, 2.363640019]\}$$

$$o := [0.4144657898, 2.363640018]$$

$$T := \left[\frac{9 + 8x + 2y}{2 + 7x + 9y}, \frac{1 + 9x + 8y}{4 + 9x + y} \right]$$

$$s := [[-1.243114444, 0.7033667125]]$$

$$\emptyset$$

$$o := [0.8372476000, 1.647014384]$$

$$T := \left[\frac{3 + 4x + 4y}{10 + 2x + 7y}, \frac{2 + 3x + 5y}{7 + 8x + 2y} \right]$$

$$s := [[-4.681265315, 0.3465132982]]$$

$$\emptyset$$

$$o := [0.4783359831, 0.5027660125]$$

$$T := \left[\frac{9 + 4x + 8y}{7 + 4x + 9y}, \frac{6 + 5x + 3y}{8 + 8x + 4y} \right]$$

$$s := [[-3.046174363, 0.5358713789]]$$

$$\emptyset$$

$$o := [1.074391601, 0.6945426741]$$

$$T := \left[\frac{3 + 2x + 7y}{8 + 9x + 4y}, \frac{3 + 10x + y}{1 + 5x + 10y} \right]$$

$$s := [[0.5939713856, 0.8085972804]]$$

$$\{[0.5939713856, 0.8085972804]\}$$

$$o := [0.5939713849, 0.8085972812]$$

$$T := \left[\frac{9 + 9x + 3y}{2 + 9x + 7y}, \frac{10 + 7x + 9y}{8 + 2x + 10y} \right]$$

$$s := [[1.092535833, 1.270515596]]$$

$$\{[1.092535833, 1.270515596]\}$$

$$o := [1.092535833, 1.270515596]$$

$$T := \left[\frac{2 + 2x + 4y}{3 + 5x + y}, \frac{7 + 3x + 9y}{4 + 2x + y} \right]$$

$$s := [[1.525848560, 4.513433387]]$$

$$\{[1.525848560, 4.513433387]\}$$

$$o := [1.525848561, 4.513433387]$$

$$T := \left[\frac{10 + 4x + y}{7 + 6x + y}, \frac{5 + 9x + 2y}{7 + 4x + 5y} \right]$$

$$s := [[1.061042423, 1.015795157]]$$

$$\{[1.061042423, 1.015795157]\}$$

$$o := [1.061042422, 1.015795157]$$

$$T := \left[\frac{10 + 10x + 4y}{6 + 2x + 10y}, \frac{3 + 6x + 6y}{6 + 2x + 8y} \right]$$

$$s := [[1.495453551, 1.050619767]]$$

$$\{[1.495453551, 1.050619767]\}$$

$$o := [1.495453551, 1.050619768]$$

$$T := \left[\frac{7 + 4x + 9y}{10 + 9x + 8y}, \frac{2 + x + 3y}{3 + 7x + 9y} \right]$$

$$s := [[0.3190821644, -0.6466518643]]$$

$$\emptyset$$

$$o := [0.6788668128, 0.3420901707]$$

$$T := \left[\frac{7 + 8x + 9y}{4 + 8x + 6y}, \frac{6 + 9x + 7y}{8 + 8x + 9y} \right]$$

$$s := [[1.289419297, 0.9047519470]]$$

$$\{[1.289419297, 0.9047519470]\}$$

$$o := [1.289419298, 0.9047519465]$$

$$T := \left[\frac{2 + 10x + 9y}{2 + 8x + y}, \frac{3 + 7x + 10y}{6 + 6x + 9y} \right]$$

$$s := [[-0.6159259622, 0.6200469984]]$$

$$\emptyset$$

$$o := [1.684243145, 0.9868363262]$$

$$T := \left[\frac{10 + 4x + y}{5 + 9x + y}, \frac{5 + 7x + 10y}{8 + 10x + 9y} \right]$$

$$s := [[1., 0.7928365250], [-1.141426848, 0.2728416366]]$$

$$\{[1., 0.7928365250]\}$$

$$o := [1.000000000, 0.7928365249]$$

$$T := \left[\frac{4 + 9x + 5y}{6 + 9x + 10y}, \frac{1 + 2x + 7y}{5 + 3x + 7y} \right]$$

$$s := [[-0.5394055158, 0.02278623090]]$$

$\emptyset$

$$o := [0.7338202592, 0.5795183110]$$

$$T := \left[\frac{4 + 5x + 4y}{6 + 6x + y}, \frac{7 + 8x + 5y}{9 + 4x + 3y} \right]$$

$$s := [[1.057568265, 1.280665939]]$$

$$\{[1.057568265, 1.280665939]\}$$

$$o := [1.057568267, 1.280665940]$$

$$T := \left[\frac{3 + 4x + 3y}{10 + 3x + 2y}, \frac{3 + 4x + 2y}{10 + 10x + 9y} \right]$$

$$s := [[0.4875056705, 0.3150730527]]$$

$$\{[0.4875056705, 0.3150730527]\}$$

$$o := [0.4875056704, 0.3150730530]$$

$$T := \left[\frac{6 + 9x + 6y}{8 + 8x + 5y}, \frac{5 + x + 10y}{5 + 10x + 8y} \right]$$

$$s := [[0.7446531381, -1.013990416]]$$

$\emptyset$

$$o := [0.9785367344, 0.6156654380]$$

$$T := \left[\frac{8 + x + 4y}{1 + 2x + 7y}, \frac{8 + x + 2y}{4 + 3x + 8y} \right]$$

$$s := [[-0.5000000000, -1.], [1.366702326, 0.7659984953]]$$

$$\{[1.366702326, 0.7659984953]\}$$

$$o := [1.366702327, 0.7659984956]$$

$$T := \left[\frac{4 + x + 7y}{9 + 3x + 5y}, \frac{10 + 8x + 2y}{4 + 6x + 7y} \right]$$

$$s := [[0.7468456632, 1.117071550]]$$

$$\{[0.7468456632, 1.117071550]\}$$

$$o := [0.7468456634, 1.117071550]$$

$$T := \left[\frac{3 + 4x + y}{4 + 5x + 5y}, \frac{2 + 10x + 6y}{7 + 9x + 4y} \right]$$

$$s := [[0.5562217875, 0.8158325319]]$$

$$\{[0.5562217875, 0.8158325319]\}$$

$$o := [0.5562217875, 0.8158325319]$$

> `I count 12 matches. Any time SSSg worked, the numbers matched`

I count 12 matches. Any time SSSg worked, the numbers matched

(6)

> #3

for i from 0 to 20 do

T:=RT([x,y,z],10);ss := SSg(T,[x,y,z]); SSSg(T,[x,y,z]);

o:= ORB(T,[x,y,z],[6.,8.,11.],1000,1010)[-1];

if(ss[1] = o) then print(`match!`) end

end

$$T := \left[\frac{4 + 7x + 8y + 9z}{4 + 3x + 5y + 3z}, \frac{10 + 9x + 6y + 3z}{5 + 4x + 6y + z}, \frac{9 + 3x + 7y + 4z}{3 + x + y + 10z} \right]$$

$$ss := [[-0.941164019, -0.4946401682, 0.6568000514]]$$

$\emptyset$

$$o := [1.958836241, 1.722010465, 1.512476885]$$

$$T := \left[\frac{7 + 9x + 5y + 7z}{6 + 2x + 5y + 5z}, \frac{4 + 8x + 4y + 6z}{4 + 10x + 8y + 4z}, \frac{1 + 4x + y + 3z}{9 + 9x + 9y + 8z} \right]$$

$$ss := [[2.015715168, 0.7912205969, 0.293205829]]$$

$$\{[2.015715168, 0.7912205969, 0.293205829]\}$$

$$o := [2.015715169, 0.7912206110, 0.2932058194]$$

$$T := \left[\frac{10 + 3x + 3y + 10z}{1 + 4x + 7y + 2z}, \frac{7 + 5x + 8y + 10z}{6 + 7x + 4y + 2z}, \frac{9 + 9x + 8y + 2z}{5 + 10x + 6y + 6z} \right]$$

$$ss := [[-1.622143010, -0.577505321, 0.9105637984]]$$

$\emptyset$

$$o := [1.500570156, 1.500645767, 1.038245610]$$

$$T := \left[\frac{1 + 5x + 10y + 2z}{10 + 6x + 4y + z}, \frac{4 + 4x + y + z}{6 + 3x + 3y + 6z}, \frac{7 + 6x + 2y + 7z}{8 + 9x + 10y + 5z} \right]$$

$$ss := [[-0.9574784304, 0.01236633332, -0.1548034307]]$$

$\emptyset$

$$o := [0.6749129744, 0.5650959978, 0.7412437813]$$

$$T := \left[\frac{8 + x + y + 6z}{6 + 2x + 6y + 6z}, \frac{3 + 7x + 6y + 8z}{2 + 5x + 4y + 6z}, \frac{10 + 3x + 7y + 4z}{2 + 8x + 8y + 6z} \right]$$

$$ss := [[0.7369176546, 1.420217607, 1.032608560]]$$

$$\{[0.7369176546, 1.420217607, 1.032608560]\}$$

$$o := [0.7369176545, 1.420217607, 1.032608560]$$

$$T := \left[\frac{2 + 7x + y + 10z}{2 + 5x + 6y + 4z}, \frac{2 + 5x + 8y + 6z}{3 + 8x + 2y + 8z}, \frac{3 + 3x + 7y + 10z}{8 + 5x + 5y + 6z} \right]$$

$$ss := [[1.175357162, 0.975420654, 0.9311796229]]$$

$$\begin{aligned}
& \{[1.175357162, 0.975420654, 0.9311796229]\} \\
& o := [1.175357158, 0.9754206550, 0.9311796231] \\
& T := \left[\frac{5 + 9x + 8y + 7z}{1 + 7x + 2y + 4z}, \frac{8 + 3x + 3y + z}{9 + 4x + 3y + 2z}, \frac{10 + x + 9y + z}{8 + 8x + 3y + 6z} \right] \\
& ss := [[0.7306922254, 1.245876098, -3.741378490]] \\
& \emptyset \\
& o := [1.810029478, 0.8259976043, 0.6855366854] \\
& T := \left[\frac{3 + 4x + 5y + 5z}{2 + 5x + 6y + 10z}, \frac{5 + 6x + 10y + 9z}{2 + 2x + 5y + 8z}, \frac{10 + 3x + 2y + z}{6 + 4x + 8y + 8z} \right] \\
& ss := [[0.80233151, 1.919669213, 0.5765403794]] \\
& \{[0.80233151, 1.919669213, 0.5765403794]\} \\
& o := [0.8023315104, 1.919669215, 0.5765403798] \\
& T := \left[\frac{10 + 10x + 7y + 6z}{10 + 8x + 2y + 8z}, \frac{7 + 2x + 3y + 10z}{3 + 2x + 2y + 6z}, \frac{10 + 2x + 7y + 8z}{2 + x + 5y + 6z} \right] \\
& ss := [[-3.466063024, 2.236265849, 1.629269003]] \\
& \emptyset \\
& o := [1.196741140, 1.658883029, 1.730353070] \\
& T := \left[\frac{7 + 4x + 2y + 8z}{7 + 3x + 5y + 8z}, \frac{6 + 7x + y + 10z}{9 + 8x + 9y + 5z}, \frac{6 + 6x + 4y + 5z}{7 + 10x + 9y + z} \right] \\
& ss := [[0.9302381911, 0.770880373, 0.77136573]] \\
& \{[0.9302381911, 0.770880373, 0.77136573]\} \\
& o := [0.9302381911, 0.7708803738, 0.7713656877] \\
& T := \left[\frac{9 + 2x + 5y + z}{1 + 9x + 5y + 8z}, \frac{8 + 9x + 8y + 3z}{10 + 8x + 3y + 6z}, \frac{2 + x + 7y + z}{9 + 10x + 5y + 3z} \right] \\
& ss := [[0.9158319774, 1.139130954, 0.449920176]] \\
& \{[0.9158319774, 1.139130954, 0.449920176]\} \\
& o := [0.9158319775, 1.139130955, 0.4499201723] \\
& T := \left[\frac{6 + x + 2y + 5z}{2 + 3x + 5y + 8z}, \frac{7 + x + 10y + 4z}{3 + 2x + 3y + 10z}, \frac{10 + 3x + 7y + 7z}{5 + 10x + 9y + 2z} \right] \\
& ss := [[0.4660840225, 0.1773460488, -3.794154628]] \\
& \emptyset \\
& o := [0.7595396407, 1.295222129, 1.097576571] \\
& T := \left[\frac{9 + 4x + y + 4z}{1 + 2x + 9y + 7z}, \frac{7 + 7x + 10y + 2z}{5 + 10x + 7y + 8z}, \frac{7 + 4x + 6y + 3z}{2 + x + 4y + 9z} \right] \\
& ss := [[0.1330577670, 3.817588204, -2.805750886]]
\end{aligned}$$

$\emptyset$

$$o := [0.9993851457, 0.8162962411, 1.159917855]$$

$$T := \left[\frac{7 + 10x + y + 2z}{4 + 8x + 10y + 7z}, \frac{2 + 5x + 6y + 9z}{1 + 2x + y + z}, \frac{9 + 7x + 3y + 10z}{3 + 5x + y + 8z} \right]$$

$$ss := [[-1.036015419, 0.9579395889, -0.332856605]]$$

$\emptyset$

$$o := [0.2426705573, 5.993893671, 1.880513400]$$

$$T := \left[\frac{4 + x + 6y + 6z}{7 + 10x + 4y + 9z}, \frac{6 + 10x + 6y + 2z}{4 + 5x + 9y + z}, \frac{10 + 9x + 7y + z}{8 + 5x + 8y + 8z} \right]$$

$$ss := [[0.2222077139, -1.036746257, 0.7814731017]]$$

$\emptyset$

$$o := [0.6470322245, 1.146049078, 0.8971117965]$$

$$T := \left[\frac{10 + 7x + 4y + 2z}{7 + 2x + 6y + z}, \frac{3 + 4x + 8y + 4z}{4 + x + 10y + 8z}, \frac{10 + 10x + 10y + 3z}{6 + 2x + 6y + 9z} \right]$$

$$ss := [[1.647520977, 0.8628835718, 1.437898802]]$$

$$\{[1.647520977, 0.8628835718, 1.437898802]\}$$

$$o := [1.647520977, 0.8628835718, 1.437898803]$$

$$T := \left[\frac{7 + 2x + 8y + 2z}{2 + 3x + 4y + 8z}, \frac{6 + 9x + y + 2z}{3 + 8x + 4y + 5z}, \frac{2 + 10x + 3y + 2z}{2 + x + 6y + 10z} \right]$$

$$ss := [[1.105743061, 0.9229704671, 0.968966059]]$$

$$\{[1.105743061, 0.9229704671, 0.968966059]\}$$

$$o := [1.105743061, 0.9229704676, 0.9689660567]$$

$$T := \left[\frac{6 + 8x + y + 10z}{9 + x + 7y + 3z}, \frac{1 + x + 5y + 2z}{7 + 6x + y + 3z}, \frac{10 + x + 2y + 2z}{1 + 7x + 8y + 5z} \right]$$

$$ss := [[1.914027692, 0.271416183, 0.6910891283]]$$

$$\{[1.914027692, 0.271416183, 0.6910891283]\}$$

$$o := [1.914027687, 0.2714161817, 0.6910891287]$$

$$T := \left[\frac{2 + 10x + 3y + 8z}{4 + 2x + 10y + 4z}, \frac{10 + x + 3y + 8z}{10 + 4x + 10y + 4z}, \frac{6 + 10x + 3y + 9z}{5 + 9x + 8y + z} \right]$$

$$ss := [[-0.638137318, 0.6726798708, -0.347536735]]$$

$\emptyset$

$$o := [1.437013435, 0.8378430766, 1.347422454]$$

$$T := \left[\frac{1 + 7x + 9y + 10z}{4 + 5x + y + 2z}, \frac{10 + 5x + 2y + 8z}{5 + 5x + 3y + 5z}, \frac{9 + 2x + 10y + z}{3 + x + 3y + 7z} \right]$$

$$ss := [[2.213613097, 1.295890471, 1.447243608]]$$

$$\begin{aligned}
& \{[2.213613097, 1.295890471, 1.447243608]\} \\
& o := [2.213613097, 1.295890471, 1.447243619] \\
& T := \left[\frac{9 + 5x + y + 8z}{4 + 2x + 3y + 2z}, \frac{8 + 6x + y + z}{4 + 7x + 7y + 9z}, \frac{6 + 3x + y + 6z}{5 + 8x + 2y + 2z} \right] \\
& ss := [[2.188885987, 0.735753344, 0.6872137320]] \\
& \{[2.188885987, 0.735753344, 0.6872137320]\} \\
& o := [2.188885988, 0.7357533222, 0.6872137296] \tag{7}
\end{aligned}$$

> `11/20 times. same as above, they match if SSSg is not empty`

11/20 times. same as above, they match if SSSg is not empty (8)

> #4

```
f:=RR([z[1],z[2]],10); T:=RecToTs(2,z,f);SSg(T,[z[1],z[2]]); SSSg
(T,[z[1],z[2]]);
Orbk(2,z,f,[5.,8.],2000,2010)[-1];
```

$$\begin{aligned}
& f := \frac{5 + z_1 + 5z_2}{6 + 7z_1 + 9z_2} \\
& T := \left[\frac{5 + z_1 + 5z_2}{6 + 7z_1 + 9z_2}, z_1 \right], [z_1, z_2] \\
& [[0.5590169942, 0.5590169942]] \\
& \{[0.5590169942, 0.5590169942]\} \\
& 0.5590169944 \tag{9}
\end{aligned}$$

> #5

```
for i from 0 to 20 do
  f:=RR([z[1],z[2],z[3]],10); T:=RecToTs(3,z,f);SSg(T,[z[1],z[2],
z[3]]);
  SSSg(T,[z[1],z[2],z[3]]); Orbk(3,z,f,[5.,8.,11.],2000,2010)[-1]
;
end
```

$$\begin{aligned}
& f := \frac{6 + z_1 + 10z_2 + 5z_3}{10 + z_1 + 6z_2 + 4z_3} \\
& T := \left[\frac{6 + z_1 + 10z_2 + 5z_3}{10 + z_1 + 6z_2 + 4z_3}, z_1, z_2 \right], [z_1, z_2, z_3] \\
& [[1.060023094, 1.060023094, 1.060023094]] \\
& \{[1.060023094, 1.060023094, 1.060023094]\} \\
& 1.060023095
\end{aligned}$$

$$f := \frac{10 + 2 z_1 + 6 z_2 + 3 z_3}{5 + 6 z_1 + 2 z_2 + 6 z_3}$$

$$T := \left[\frac{10 + 2 z_1 + 6 z_2 + 3 z_3}{5 + 6 z_1 + 2 z_2 + 6 z_3}, z_1, z_2 \right], [z_1, z_2, z_3]$$

$$[[1.086182544, 1.086182544, 1.086182544]]$$

$$\{[1.086182544, 1.086182544, 1.086182544]\}$$

$$1.086182543$$

$$f := \frac{1 + z_1 + 9 z_2 + 2 z_3}{7 + 7 z_1 + 7 z_2 + 2 z_3}$$

$$T := \left[\frac{1 + z_1 + 9 z_2 + 2 z_3}{7 + 7 z_1 + 7 z_2 + 2 z_3}, z_1, z_2 \right], [z_1, z_2, z_3]$$

$$[[0.4510619104, 0.4510619104, 0.4510619104]]$$

$$\{[0.4510619104, 0.4510619104, 0.4510619104]\}$$

$$0.4510619107$$

$$f := \frac{3 + 8 z_1 + 4 z_2 + 10 z_3}{5 + 6 z_1 + 10 z_2 + 6 z_3}$$

$$T := \left[\frac{3 + 8 z_1 + 4 z_2 + 10 z_3}{5 + 6 z_1 + 10 z_2 + 6 z_3}, z_1, z_2 \right], [z_1, z_2, z_3]$$

$$[[0.9208170917, 0.9208170917, 0.9208170917]]$$

$$\{[0.9208170917, 0.9208170917, 0.9208170917]\}$$

$$0.9208170917$$

$$f := \frac{10 + 8 z_1 + 7 z_2 + 8 z_3}{2 + 8 z_1 + 10 z_2 + 8 z_3}$$

$$T := \left[\frac{10 + 8 z_1 + 7 z_2 + 8 z_3}{2 + 8 z_1 + 10 z_2 + 8 z_3}, z_1, z_2 \right], [z_1, z_2, z_3]$$

$$[[1.143918516, 1.143918516, 1.143918516]]$$

$$\{[1.143918516, 1.143918516, 1.143918516]\}$$

$$1.143918515$$

$$f := \frac{2 + 6 z_1 + 3 z_2 + 8 z_3}{7 + 10 z_1 + 9 z_2 + z_3}$$

$$T := \left[\frac{2 + 6 z_1 + 3 z_2 + 8 z_3}{7 + 10 z_1 + 9 z_2 + z_3}, z_1, z_2 \right], [z_1, z_2, z_3]$$

[[0.6531128874, 0.6531128874, 0.6531128874]]

{[0.6531128874, 0.6531128874, 0.6531128874]}

0.6531128874

$$f := \frac{7 + z_1 + 6 z_2 + 6 z_3}{9 + 8 z_1 + 7 z_2 + 3 z_3}$$

$$T := \left[\frac{7 + z_1 + 6 z_2 + 6 z_3}{9 + 8 z_1 + 7 z_2 + 3 z_3}, z_1, z_2 \right], [z_1, z_2, z_3]$$

[[0.7445419028, 0.7445419028, 0.7445419028]]

{[0.7445419028, 0.7445419028, 0.7445419028]}

0.7445419030

$$f := \frac{7 + 10 z_1 + 7 z_2 + 3 z_3}{1 + 10 z_1 + 3 z_2 + 8 z_3}$$

$$T := \left[\frac{7 + 10 z_1 + 7 z_2 + 3 z_3}{1 + 10 z_1 + 3 z_2 + 8 z_3}, z_1, z_2 \right], [z_1, z_2, z_3]$$

[[1.185853419, 1.185853419, 1.185853419]]

{[1.185853419, 1.185853419, 1.185853419]}

1.185853419

$$f := \frac{8 + 6 z_1 + 9 z_2 + 10 z_3}{5 + 7 z_1 + 7 z_2 + 5 z_3}$$

$$T := \left[\frac{8 + 6 z_1 + 9 z_2 + 10 z_3}{5 + 7 z_1 + 7 z_2 + 5 z_3}, z_1, z_2 \right], [z_1, z_2, z_3]$$

[[1.361816203, 1.361816203, 1.361816203]]

{[1.361816203, 1.361816203, 1.361816203]}

1.361816204

$$f := \frac{6 + 6 z_1 + 3 z_2 + 9 z_3}{7 + 3 z_1 + 3 z_2 + 8 z_3}$$

$$T := \left[\frac{6 + 6 z_1 + 3 z_2 + 9 z_3}{7 + 3 z_1 + 3 z_2 + 8 z_3}, z_1, z_2 \right], [z_1, z_2, z_3]$$

[[1.156341369, 1.156341369, 1.156341369]]

$$\{[1.156341369, 1.156341369, 1.156341369]\}$$

$$1.156341369$$

$$f := \frac{2 + 7 z_1 + 6 z_2 + 3 z_3}{7 + 8 z_1 + 7 z_2 + z_3}$$

$$T := \left[\frac{2 + 7 z_1 + 6 z_2 + 3 z_3}{7 + 8 z_1 + 7 z_2 + z_3}, z_1, z_2 \right], [z_1, z_2, z_3]$$

$$[[0.7330260092, 0.7330260092, 0.7330260092]]$$

$$\{[0.7330260092, 0.7330260092, 0.7330260092]\}$$

$$0.7330260092$$

$$f := \frac{3 + 9 z_1 + z_2 + 2 z_3}{4 + z_1 + 9 z_2 + 7 z_3}$$

$$T := \left[\frac{3 + 9 z_1 + z_2 + 2 z_3}{4 + z_1 + 9 z_2 + 7 z_3}, z_1, z_2 \right], [z_1, z_2, z_3]$$

$$[[0.7167854572, 0.7167854572, 0.7167854572]]$$

$$\{[0.7167854572, 0.7167854572, 0.7167854572]\}$$

$$0.7167854569$$

$$f := \frac{5 + 5 z_1 + 5 z_2 + 4 z_3}{6 + z_1 + 6 z_2 + 10 z_3}$$

$$T := \left[\frac{5 + 5 z_1 + 5 z_2 + 4 z_3}{6 + z_1 + 6 z_2 + 10 z_3}, z_1, z_2 \right], [z_1, z_2, z_3]$$

$$[[0.8264632718, 0.8264632718, 0.8264632718]]$$

$$\{[0.8264632718, 0.8264632718, 0.8264632718]\}$$

$$0.8264632721$$

$$f := \frac{1 + 7 z_1 + 10 z_2 + 3 z_3}{7 + 9 z_1 + 2 z_2 + 9 z_3}$$

$$T := \left[\frac{1 + 7 z_1 + 10 z_2 + 3 z_3}{7 + 9 z_1 + 2 z_2 + 9 z_3}, z_1, z_2 \right], [z_1, z_2, z_3]$$

$$[[0.7194933460, 0.7194933460, 0.7194933460]]$$

$$\{[0.7194933460, 0.7194933460, 0.7194933460]\}$$

$$0.7194933456$$

$$f := \frac{3 + 4 z_1 + 10 z_2 + 4 z_3}{8 + 8 z_1 + 8 z_2 + 4 z_3}$$

$$T := \left[\frac{3 + 4 z_1 + 10 z_2 + 4 z_3}{8 + 8 z_1 + 8 z_2 + 4 z_3}, z_1, z_2 \right], [z_1, z_2, z_3]$$

$$[[0.7109772230, 0.7109772230, 0.7109772230]]$$

$$\{[0.7109772230, 0.7109772230, 0.7109772230]\}$$

$$0.7109772230$$

$$f := \frac{2 + 10 z_1 + z_2 + 5 z_3}{1 + 10 z_1 + 10 z_2 + 7 z_3}$$

$$T := \left[\frac{2 + 10 z_1 + z_2 + 5 z_3}{1 + 10 z_1 + 10 z_2 + 7 z_3}, z_1, z_2 \right], [z_1, z_2, z_3]$$

$$[[-0.1111111111, -0.1111111111, -0.1111111111], [0.6666666667, 0.6666666667, 0.6666666667]]$$

$$\{[0.6666666667, 0.6666666667, 0.6666666667]\}$$

$$0.6666666668$$

$$f := \frac{6 + 9 z_1 + z_2 + 4 z_3}{1 + 5 z_1 + z_2 + 4 z_3}$$

$$T := \left[\frac{6 + 9 z_1 + z_2 + 4 z_3}{1 + 5 z_1 + z_2 + 4 z_3}, z_1, z_2 \right], [z_1, z_2, z_3]$$

$$[[1.661187421, 1.661187421, 1.661187421]]$$

$$\{[1.661187421, 1.661187421, 1.661187421]\}$$

$$1.661187421$$

$$f := \frac{3 + 8 z_1 + 5 z_2 + 10 z_3}{5 + 8 z_1 + 10 z_2 + 2 z_3}$$

$$T := \left[\frac{3 + 8 z_1 + 5 z_2 + 10 z_3}{5 + 8 z_1 + 10 z_2 + 2 z_3}, z_1, z_2 \right], [z_1, z_2, z_3]$$

$$[[1.043717104, 1.043717104, 1.043717104]]$$

$$\{[1.043717104, 1.043717104, 1.043717104]\}$$

$$1.043717104$$

$$f := \frac{6 + 5 z_1 + 6 z_2 + 5 z_3}{6 + 2 z_1 + 7 z_2 + 6 z_3}$$

$$T := \left[\frac{6 + 5 z_1 + 6 z_2 + 5 z_3}{6 + 2 z_1 + 7 z_2 + 6 z_3}, z_1, z_2 \right], [z_1, z_2, z_3]$$

$$[[1.048253686, 1.048253686, 1.048253686]]$$

$$\{[1.048253686, 1.048253686, 1.048253686]\}$$

$$1.048253686$$

$$f := \frac{2 + 9 z_1 + 2 z_2 + 3 z_3}{8 + 8 z_1 + 7 z_2 + 2 z_3}$$

$$T := \left[\frac{2 + 9 z_1 + 2 z_2 + 3 z_3}{8 + 8 z_1 + 7 z_2 + 2 z_3}, z_1, z_2 \right], [z_1, z_2, z_3]$$

$$[[0.5622022661, 0.5622022661, 0.5622022661]]$$

$$\{[0.5622022661, 0.5622022661, 0.5622022661]\}$$

$$0.5622022664$$

$$f := \frac{7 + 7 z_1 + 4 z_2 + 4 z_3}{9 + 4 z_1 + 10 z_2 + 8 z_3}$$

$$T := \left[\frac{7 + 7 z_1 + 4 z_2 + 4 z_3}{9 + 4 z_1 + 10 z_2 + 8 z_3}, z_1, z_2 \right], [z_1, z_2, z_3]$$

$$[[0.7166884243, 0.7166884243, 0.7166884243]]$$

$$\{[0.7166884243, 0.7166884243, 0.7166884243]\}$$

$$0.7166884244$$

(10)

> `they all matched`

they all matched

(11)

> #Q6

> for i from 0 to 20 do

 L:=rand(1..3)(); a:=rand(1..50)/20.; c:=rand(1..50)/20.; T:=
NicholsonBailey(L,a,c,N,P)
; SSg(T,[N,P]); sss:=SSSg(T,[N,P]);
end

$$L := 2$$

$$a := 0.4500000000$$

$$c := 2.1000000000$$

$$T := [2 N e^{-0.4500000000 P}, 2.1000000000 N (1 - e^{-0.4500000000 P})]$$

$$[[0., 0.], [1.466978160, 1.540327068]]$$

$$sss := \emptyset$$

```

L := 2
a := 1.100000000
c := 1.250000000
T := [2 N e-1.100000000 P, 1.250000000 N (1 - e-1.100000000 P)]
[[0., 0.], [1.008214081, 0.6301338005]]

```

```

sss := ∅
L := 3
a := 0.1500000000
c := 0.3500000000
T := [3 N e-0.1500000000 P, 0.3500000000 N (1 - e-0.1500000000 P)]
[[0., 0.], [31.38892253, 7.324081924]]

```

```

sss := ∅
L := 1
a := 1.500000000
c := 1.750000000
T := [N e-1.500000000 P, 1.750000000 N (1 - e-1.500000000 P)]
[[N, 0.]]

```

Error, (in SSSg) cannot determine if this expression is true or false: max(1., 2.625000000*abs(N)) < 1

> `I can't get this to run more than 3 or 4 times in a row but I haven't seen a non empty set`

I can't get this to run more than 3 or 4 times in a row but I haven't seen a non empty set (12)

```

> #Q7
ne:=0

```

ne := 0 (13)

```

> for i from 0 to 110 do
  a:=rand(1..10)/10.: r:=rand(1..10)/10.: K:=rand(1..10)():
  T:=NicholsonBaileyM(a,r,K,14,N,P); s :=SSSg(T,[N,P]);
  if (s <> {}) then print(`not empty`); ne := ne + 1 end
end

```

```

a := 0.7000000000
r := 0.3000000000
K := 4
T := [14 e-1.750000000 - 0.3000000000 N, 14 - 14 e-0.3000000000 N]
s := {[1.535028323, 5.166521902]}

```

not empty

$$a := 0.3000000000$$

$$r := 0.5000000000$$

$$K := 1$$

$$T := \left[14 e^{-3.900000000 - 0.5000000000 N}, 14 - 14 e^{-0.5000000000 N} \right]$$

$$s := \{ [0.2500781644, 1.645526213] \}$$

not empty

$$a := 0.6000000000$$

$$r := 0.3000000000$$

$$K := 9$$

$$T := \left[14 e^{-0.3333333333 - 0.3000000000 N}, 14 - 14 e^{-0.3000000000 N} \right]$$

$$s := \emptyset$$

$$a := 0.7000000000$$

$$r := 0.6000000000$$

$$K := 1$$

$$T := \left[14 e^{-9.100000000 - 0.6000000000 N}, 14 - 14 e^{-0.6000000000 N} \right]$$

$$s := \{ [0.001561856994, 0.0131134534] \}$$

not empty

$$a := 0.7000000000$$

$$r := 0.6000000000$$

$$K := 1$$

$$T := \left[14 e^{-9.100000000 - 0.6000000000 N}, 14 - 14 e^{-0.6000000000 N} \right]$$

$$s := \{ [0.001561856994, 0.0131134534] \}$$

not empty

$$a := 0.4000000000$$

$$r := 1.000000000$$

$$K := 7$$

$$T := \left[14 e^{-0.4000000000 - 1.000000000 N}, 14 - 14 e^{-1.000000000 N} \right]$$

$$s := \emptyset$$

$$a := 0.1000000000$$

$$r := 0.9000000000$$

$$K := 5$$

$$T := \left[14 e^{-0.1800000000 - 0.9000000000 N}, 14 - 14 e^{-0.9000000000 N} \right]$$

$$s := \emptyset$$

$$a := 0.7000000000$$

$$r := 1.0000000000$$

$$K := 2$$

$$T := \left[14 e^{-4.200000000 - 1.000000000 N}, 14 - 14 e^{-1.000000000 N} \right]$$

$$s := \{ [0.1760491861, 2.259925696] \}$$

not empty

$$a := 0.2000000000$$

$$r := 0.6000000000$$

$$K := 1$$

$$T := \left[14 e^{-2.600000000 - 0.600000000 N}, 14 - 14 e^{-0.600000000 N} \right]$$

$$s := \{ [0.6881089771, 4.735480993] \}$$

not empty

$$a := 0.6000000000$$

$$r := 0.5000000000$$

$$K := 3$$

$$T := \left[14 e^{-2.200000000 - 0.500000000 N}, 14 - 14 e^{-0.500000000 N} \right]$$

$$s := \{ [0.9599217259, 5.336693465] \}$$

not empty

$$a := 0.5000000000$$

$$r := 0.7000000000$$

$$K := 10$$

$$T := \left[14 e^{-0.200000000 - 0.700000000 N}, 14 - 14 e^{-0.700000000 N} \right]$$

$$s := \emptyset$$

$$a := 0.7000000000$$

$$r := 0.3000000000$$

$$K := 1$$

$$T := \left[14 e^{-9.100000000 - 0.300000000 N}, 14 - 14 e^{-0.300000000 N} \right]$$

$$s := \{ [0.001562588642, 0.0065613343] \}$$

not empty

$$a := 0.3000000000$$

$$r := 1.0000000000$$

$$K := 7$$

$T := \left[14 e^{-0.3000000000 - 1.000000000 N}, 14 - 14 e^{-1.000000000 N} \right]$
 $s := \emptyset$
 $a := 1.000000000$
 $r := 0.7000000000$
 $K := 1$
 $T := \left[14 e^{-13.00000000 - 0.7000000000 N}, 14 - 14 e^{-0.7000000000 N} \right]$
 $s := \{ [0.00003164391075, 0.0003101069] \}$
not empty
 $a := 0.8000000000$
 $r := 0.3000000000$
 $K := 7$
 $T := \left[14 e^{-0.8000000000 - 0.3000000000 N}, 14 - 14 e^{-0.3000000000 N} \right]$
 $s := \{ [2.753702816, 7.871521677] \}$
not empty
 $a := 1.000000000$
 $r := 0.5000000000$
 $K := 9$
 $T := \left[14 e^{-0.5555555556 - 0.5000000000 N}, 14 - 14 e^{-0.5000000000 N} \right]$
 $s := \emptyset$
 $a := 0.5000000000$
 $r := 0.8000000000$
 $K := 9$
 $T := \left[14 e^{-0.2777777778 - 0.8000000000 N}, 14 - 14 e^{-0.8000000000 N} \right]$
 $s := \emptyset$
 $a := 1.000000000$
 $r := 0.6000000000$
 $K := 6$
 $T := \left[14 e^{-1.333333333 - 0.6000000000 N}, 14 - 14 e^{-0.6000000000 N} \right]$
 $s := \{ [1.500204393, 8.308722761] \}$
not empty
 $a := 0.9000000000$
 $r := 0.2000000000$
 $K := 1$

$$\begin{aligned}
T &:= \left[14 e^{-11.70000000 - 0.2000000000 N}, 14 - 14 e^{-0.2000000000 N} \right] \\
s &:= \{[0.0001161107719, 0.00032510639]\} \\
&\textit{not empty} \\
a &:= 0.4000000000 \\
r &:= 0.5000000000 \\
K &:= 2 \\
T &:= \left[14 e^{-2.400000000 - 0.5000000000 N}, 14 - 14 e^{-0.5000000000 N} \right] \\
s &:= \{[0.8361084819, 4.783428731]\} \\
&\textit{not empty} \\
a &:= 0.7000000000 \\
r &:= 0.3000000000 \\
K &:= 3 \\
T &:= \left[14 e^{-2.566666667 - 0.3000000000 N}, 14 - 14 e^{-0.3000000000 N} \right] \\
s &:= \{[0.8364795524, 3.107075349]\} \\
&\textit{not empty} \\
a &:= 0.9000000000 \\
r &:= 0.7000000000 \\
K &:= 10 \\
T &:= \left[14 e^{-0.3600000000 - 0.7000000000 N}, 14 - 14 e^{-0.7000000000 N} \right] \\
s &:= \emptyset \\
a &:= 0.3000000000 \\
r &:= 0.8000000000 \\
K &:= 10 \\
T &:= \left[14 e^{-0.1200000000 - 0.8000000000 N}, 14 - 14 e^{-0.8000000000 N} \right] \\
s &:= \emptyset \\
a &:= 0.9000000000 \\
r &:= 0.6000000000 \\
K &:= 9 \\
T &:= \left[14 e^{-0.5000000000 - 0.6000000000 N}, 14 - 14 e^{-0.6000000000 N} \right] \\
s &:= \emptyset \\
a &:= 0.9000000000 \\
r &:= 0.3000000000 \\
K &:= 6
\end{aligned}$$

$$\begin{aligned}
T &:= \left[14 e^{-1.200000000 - 0.3000000000 N}, 14 - 14 e^{-0.3000000000 N} \right] \\
s &:= \{[2.187563384, 6.737033789]\} \\
&\textit{not empty} \\
a &:= 0.9000000000 \\
r &:= 0.1000000000 \\
K &:= 9 \\
T &:= \left[14 e^{-0.5000000000 - 0.1000000000 N}, 14 - 14 e^{-0.1000000000 N} \right] \\
s &:= \{[5.099381236, 5.592541689]\} \\
&\textit{not empty} \\
a &:= 0.5000000000 \\
r &:= 0.3000000000 \\
K &:= 6 \\
T &:= \left[14 e^{-0.6666666666 - 0.3000000000 N}, 14 - 14 e^{-0.3000000000 N} \right] \\
s &:= \{[2.958748090, 8.237145627]\} \\
&\textit{not empty} \\
a &:= 0.6000000000 \\
r &:= 0.2000000000 \\
K &:= 2 \\
T &:= \left[14 e^{-3.600000000 - 0.2000000000 N}, 14 - 14 e^{-0.2000000000 N} \right] \\
s &:= \{[0.3562266809, 0.9627324161]\} \\
&\textit{not empty} \\
a &:= 0.6000000000 \\
r &:= 1.000000000 \\
K &:= 10 \\
T &:= \left[14 e^{-0.2400000000 - 1.000000000 N}, 14 - 14 e^{-1.000000000 N} \right] \\
s &:= \emptyset \\
a &:= 0.1000000000 \\
r &:= 0.3000000000 \\
K &:= 2 \\
T &:= \left[14 e^{-0.6000000000 - 0.3000000000 N}, 14 - 14 e^{-0.3000000000 N} \right] \\
s &:= \{[3.064217252, 8.416632137]\} \\
&\textit{not empty} \\
a &:= 0.1000000000
\end{aligned}$$

$$r := 0.4000000000$$

$$K := 8$$

$$T := \left[14 e^{-0.07500000000 - 0.4000000000 N}, 14 - 14 e^{-0.4000000000 N} \right]$$

$$s := \emptyset$$

$$a := 0.3000000000$$

$$r := 0.6000000000$$

$$K := 4$$

$$T := \left[14 e^{-0.7500000000 - 0.6000000000 N}, 14 - 14 e^{-0.6000000000 N} \right]$$

$$s := \emptyset$$

$$a := 0.8000000000$$

$$r := 1.0000000000$$

$$K := 1$$

$$T := \left[14 e^{-10.40000000 - 1.000000000 N}, 14 - 14 e^{-1.000000000 N} \right]$$

$$s := \{[0.0004258733554, 0.0059609576]\}$$

not empty

$$a := 0.9000000000$$

$$r := 0.1000000000$$

$$K := 4$$

$$T := \left[14 e^{-2.250000000 - 0.1000000000 N}, 14 - 14 e^{-0.1000000000 N} \right]$$

$$s := \{[1.296200485, 1.701992208]\}$$

not empty

$$a := 0.4000000000$$

$$r := 0.3000000000$$

$$K := 6$$

$$T := \left[14 e^{-0.5333333333 - 0.3000000000 N}, 14 - 14 e^{-0.3000000000 N} \right]$$

$$s := \{[3.171612683, 8.593653590]\}$$

not empty

$$a := 0.2000000000$$

$$r := 0.9000000000$$

$$K := 2$$

$$T := \left[14 e^{-1.200000000 - 0.9000000000 N}, 14 - 14 e^{-0.9000000000 N} \right]$$

$$s := \emptyset$$

$$a := 0.9000000000$$

$$r := 0.7000000000$$

$$K := 6$$

$$T := \left[14 e^{-1.200000000 - 0.7000000000 N}, 14 - 14 e^{-0.7000000000 N} \right]$$

$$s := \emptyset$$

$$a := 0.7000000000$$

$$r := 0.5000000000$$

$$K := 5$$

$$T := \left[14 e^{-1.260000000 - 0.5000000000 N}, 14 - 14 e^{-0.5000000000 N} \right]$$

$$s := \{[1.698556782, 8.011871424]\}$$

not empty

$$a := 0.1000000000$$

$$r := 0.3000000000$$

$$K := 2$$

$$T := \left[14 e^{-0.6000000000 - 0.3000000000 N}, 14 - 14 e^{-0.3000000000 N} \right]$$

$$s := \{[3.064217252, 8.416632137]\}$$

not empty

$$a := 1.000000000$$

$$r := 0.1000000000$$

$$K := 7$$

$$T := \left[14 e^{-1.000000000 - 0.1000000000 N}, 14 - 14 e^{-0.1000000000 N} \right]$$

$$s := \{[3.595035272, 4.227680948]\}$$

not empty

$$a := 0.8000000000$$

$$r := 0.5000000000$$

$$K := 1$$

$$T := \left[14 e^{-10.40000000 - 0.5000000000 N}, 14 - 14 e^{-0.5000000000 N} \right]$$

$$s := \{[0.0004259640298, 0.0029814307]\}$$

not empty

$$a := 0.6000000000$$

$$r := 0.5000000000$$

$$K := 3$$

$$T := \left[14 e^{-2.200000000 - 0.5000000000 N}, 14 - 14 e^{-0.5000000000 N} \right]$$

$$s := \{[0.9599217259, 5.336693465]\}$$

not empty

$$a := 0.4000000000$$

$$r := 0.3000000000$$

$$K := 6$$

$$T := \left[14 e^{-0.5333333333 - 0.3000000000 N}, 14 - 14 e^{-0.3000000000 N} \right]$$

$$s := \{[3.171612683, 8.593653590]\}$$

not empty

$$a := 0.3000000000$$

$$r := 0.8000000000$$

$$K := 2$$

$$T := \left[14 e^{-1.8000000000 - 0.8000000000 N}, 14 - 14 e^{-0.8000000000 N} \right]$$

$$s := \{[1.021828984, 7.818294880]\}$$

not empty

$$a := 0.6000000000$$

$$r := 0.7000000000$$

$$K := 7$$

$$T := \left[14 e^{-0.6000000000 - 0.7000000000 N}, 14 - 14 e^{-0.7000000000 N} \right]$$

$$s := \emptyset$$

$$a := 0.9000000000$$

$$r := 0.1000000000$$

$$K := 10$$

$$T := \left[14 e^{-0.3600000000 - 0.1000000000 N}, 14 - 14 e^{-0.1000000000 N} \right]$$

$$s := \{[5.586694827, 5.992425975]\}$$

not empty

$$a := 0.3000000000$$

$$r := 0.6000000000$$

$$K := 10$$

$$T := \left[14 e^{-0.1200000000 - 0.6000000000 N}, 14 - 14 e^{-0.6000000000 N} \right]$$

$$s := \emptyset$$

$$a := 0.4000000000$$

$$r := 0.7000000000$$

$$K := 1$$

$$T := \left[14 e^{-5.2000000000 - 0.7000000000 N}, 14 - 14 e^{-0.7000000000 N} \right]$$

$$s := \{[0.07336570660, 0.7008338870]\}$$

not empty

$$a := 0.8000000000$$

$$r := 0.1000000000$$

$$K := 2$$

$$T := [14 e^{-4.800000000 - 0.1000000000 N}, 14 - 14 e^{-0.1000000000 N}]$$

$$s := \{[0.1139114580, 0.1585711729]\}$$

not empty

$$a := 0.1000000000$$

$$r := 0.4000000000$$

$$K := 2$$

$$T := [14 e^{-0.6000000000 - 0.4000000000 N}, 14 - 14 e^{-0.4000000000 N}]$$

$$s := \emptyset$$

$$a := 1.0000000000$$

$$r := 0.3000000000$$

$$K := 8$$

$$T := [14 e^{-0.7500000000 - 0.3000000000 N}, 14 - 14 e^{-0.3000000000 N}]$$

$$s := \{[2.829664234, 8.009600770]\}$$

not empty

$$a := 0.8000000000$$

$$r := 0.8000000000$$

$$K := 10$$

$$T := [14 e^{-0.3200000000 - 0.8000000000 N}, 14 - 14 e^{-0.8000000000 N}]$$

$$s := \emptyset$$

$$a := 0.2000000000$$

$$r := 0.5000000000$$

$$K := 5$$

$$T := [14 e^{-0.3600000000 - 0.5000000000 N}, 14 - 14 e^{-0.5000000000 N}]$$

$$s := \emptyset$$

$$a := 0.8000000000$$

$$r := 0.7000000000$$

$$K := 9$$

$$T := [14 e^{-0.4444444444 - 0.7000000000 N}, 14 - 14 e^{-0.7000000000 N}]$$

$$s := \emptyset$$

$$a := 0.5000000000$$

$$r := 0.2000000000$$

$$K := 6$$

$$T := \left[14 e^{-0.6666666666 - 0.2000000000 N}, 14 - 14 e^{-0.2000000000 N} \right]$$

$$s := \{[3.540547058, 7.103955971]\}$$

not empty

$$a := 0.2000000000$$

$$r := 0.2000000000$$

$$K := 5$$

$$T := \left[14 e^{-0.3600000000 - 0.2000000000 N}, 14 - 14 e^{-0.2000000000 N} \right]$$

$$s := \{[4.209073677, 7.967010891]\}$$

not empty

$$a := 0.5000000000$$

$$r := 0.5000000000$$

$$K := 1$$

$$T := \left[14 e^{-6.500000000 - 0.5000000000 N}, 14 - 14 e^{-0.5000000000 N} \right]$$

$$s := \{[0.02083006913, 0.1450538025]\}$$

not empty

$$a := 0.9000000000$$

$$r := 0.5000000000$$

$$K := 1$$

$$T := \left[14 e^{-11.70000000 - 0.5000000000 N}, 14 - 14 e^{-0.5000000000 N} \right]$$

$$s := \{[0.0001161067277, 0.00081272350]\}$$

not empty

$$a := 0.9000000000$$

$$r := 0.5000000000$$

$$K := 1$$

$$T := \left[14 e^{-11.70000000 - 0.5000000000 N}, 14 - 14 e^{-0.5000000000 N} \right]$$

$$s := \{[0.0001161067277, 0.00081272350]\}$$

not empty

$$a := 0.8000000000$$

$$r := 0.7000000000$$

$$\begin{aligned}
& K := 1 \\
& T := \left[14 e^{-10.40000000 - 0.7000000000 N}, 14 - 14 e^{-0.7000000000 N} \right] \\
& s := \{ [0.0004259277531, 0.0041734698] \} \\
& \textit{not empty} \\
& a := 1.0000000000 \\
& r := 1.0000000000 \\
& K := 10 \\
& T := \left[14 e^{-0.4000000000 - 1.0000000000 N}, 14 - 14 e^{-1.0000000000 N} \right] \\
& s := \emptyset \\
& a := 0.4000000000 \\
& r := 0.2000000000 \\
& K := 8 \\
& T := \left[14 e^{-0.3000000000 - 0.2000000000 N}, 14 - 14 e^{-0.2000000000 N} \right] \\
& s := \{ [4.347398522, 8.131625815] \} \\
& \textit{not empty} \\
& a := 0.7000000000 \\
& r := 0.1000000000 \\
& K := 3 \\
& T := \left[14 e^{-2.566666667 - 0.1000000000 N}, 14 - 14 e^{-0.1000000000 N} \right] \\
& s := \{ [0.9751852177, 1.300802432] \} \\
& \textit{not empty} \\
& a := 0.7000000000 \\
& r := 0.4000000000 \\
& K := 3 \\
& T := \left[14 e^{-2.566666667 - 0.4000000000 N}, 14 - 14 e^{-0.4000000000 N} \right] \\
& s := \{ [0.7852761752, 3.773863350] \} \\
& \textit{not empty} \\
& a := 1.0000000000 \\
& r := 0.3000000000 \\
& K := 6 \\
& T := \left[14 e^{-1.333333333 - 0.3000000000 N}, 14 - 14 e^{-0.3000000000 N} \right] \\
& s := \{ [2.015759625, 6.352877431] \} \\
& \textit{not empty}
\end{aligned}$$

$$a := 1.000000000$$

$$r := 0.6000000000$$

$$K := 3$$

$$T := \left[14 e^{-3.666666667 - 0.6000000000 N}, 14 - 14 e^{-0.6000000000 N} \right]$$

$$s := \{[0.2990766643, 2.299736873]\}$$

not empty

$$a := 0.4000000000$$

$$r := 0.1000000000$$

$$K := 6$$

$$T := \left[14 e^{-0.5333333333 - 0.1000000000 N}, 14 - 14 e^{-0.1000000000 N} \right]$$

$$s := \{[4.987630497, 5.498060789]\}$$

not empty

$$a := 0.6000000000$$

$$r := 0.8000000000$$

$$K := 6$$

$$T := \left[14 e^{-0.8000000000 - 0.8000000000 N}, 14 - 14 e^{-0.8000000000 N} \right]$$

$$s := \emptyset$$

$$a := 0.9000000000$$

$$r := 1.000000000$$

$$K := 8$$

$$T := \left[14 e^{-0.6750000000 - 1.000000000 N}, 14 - 14 e^{-1.000000000 N} \right]$$

$$s := \emptyset$$

$$a := 0.7000000000$$

$$r := 0.3000000000$$

$$K := 3$$

$$T := \left[14 e^{-2.566666667 - 0.3000000000 N}, 14 - 14 e^{-0.3000000000 N} \right]$$

$$s := \{[0.8364795524, 3.107075349]\}$$

not empty

$$a := 0.3000000000$$

$$r := 0.2000000000$$

$$K := 7$$

$$T := \left[14 e^{-0.3000000000 - 0.2000000000 N}, 14 - 14 e^{-0.2000000000 N} \right]$$

$$s := \{[4.347398522, 8.131625815]\}$$

not empty

$$a := 0.3000000000$$

$$r := 0.8000000000$$

$$K := 10$$

$$T := \left[14 e^{-0.1200000000 - 0.8000000000 N}, 14 - 14 e^{-0.8000000000 N} \right]$$

$$s := \emptyset$$

$$a := 0.9000000000$$

$$r := 0.4000000000$$

$$K := 8$$

$$T := \left[14 e^{-0.6750000000 - 0.4000000000 N}, 14 - 14 e^{-0.4000000000 N} \right]$$

$$s := \emptyset$$

$$a := 0.2000000000$$

$$r := 0.6000000000$$

$$K := 2$$

$$T := \left[14 e^{-1.2000000000 - 0.6000000000 N}, 14 - 14 e^{-0.6000000000 N} \right]$$

$$s := \{ [1.607399479, 8.663245789] \}$$

not empty

$$a := 0.6000000000$$

$$r := 0.1000000000$$

$$K := 1$$

$$T := \left[14 e^{-7.8000000000 - 0.1000000000 N}, 14 - 14 e^{-0.1000000000 N} \right]$$

$$s := \{ [0.005733002032, 0.0080239026] \}$$

not empty

$$a := 0.6000000000$$

$$r := 0.6000000000$$

$$K := 3$$

$$T := \left[14 e^{-2.2000000000 - 0.6000000000 N}, 14 - 14 e^{-0.6000000000 N} \right]$$

$$s := \{ [0.9025842623, 5.854164849] \}$$

not empty

$$a := 0.6000000000$$

$$r := 0.3000000000$$

$$K := 2$$

$$T := \left[14 e^{-3.6000000000 - 0.3000000000 N}, 14 - 14 e^{-0.3000000000 N} \right]$$

$$s := \{[0.3449275339, 1.376261247]\}$$

not empty

$$a := 0.8000000000$$

$$r := 1.0000000000$$

$$K := 7$$

$$T := [14 e^{-0.8000000000 - 1.0000000000 N}, 14 - 14 e^{-1.0000000000 N}]$$

$$s := \emptyset$$

$$a := 0.6000000000$$

$$r := 0.2000000000$$

$$K := 9$$

$$T := [14 e^{-0.3333333333 - 0.2000000000 N}, 14 - 14 e^{-0.2000000000 N}]$$

$$s := \{[4.270253738, 8.040380826]\}$$

not empty

$$a := 1.0000000000$$

$$r := 0.4000000000$$

$$K := 10$$

$$T := [14 e^{-0.4000000000 - 0.4000000000 N}, 14 - 14 e^{-0.4000000000 N}]$$

$$s := \emptyset$$

$$a := 0.5000000000$$

$$r := 0.3000000000$$

$$K := 4$$

$$T := [14 e^{-1.2500000000 - 0.3000000000 N}, 14 - 14 e^{-0.3000000000 N}]$$

$$s := \{[2.122127443, 6.593047423]\}$$

not empty

$$a := 0.2000000000$$

$$r := 0.1000000000$$

$$K := 6$$

$$T := [14 e^{-0.2666666667 - 0.1000000000 N}, 14 - 14 e^{-0.1000000000 N}]$$

$$s := \{[5.927641881, 6.260840101]\}$$

not empty

$$a := 0.9000000000$$

$$r := 0.5000000000$$

$$K := 4$$

$$\begin{aligned}
T &:= \left[14 e^{-2.250000000 - 0.5000000000 N}, 14 - 14 e^{-0.5000000000 N} \right] \\
s &:= \{[0.9278611087, 5.196698908]\} \\
&\textit{not empty} \\
a &:= 1.0000000000 \\
r &:= 1.0000000000 \\
K &:= 4 \\
T &:= \left[14 e^{-2.500000000 - 1.000000000 N}, 14 - 14 e^{-1.000000000 N} \right] \\
s &:= \{[0.6188881106, 6.460399330]\} \\
&\textit{not empty} \\
a &:= 0.5000000000 \\
r &:= 0.5000000000 \\
K &:= 4 \\
T &:= \left[14 e^{-1.250000000 - 0.5000000000 N}, 14 - 14 e^{-0.5000000000 N} \right] \\
s &:= \{[1.707755172, 8.039348761]\} \\
&\textit{not empty} \\
a &:= 0.4000000000 \\
r &:= 0.7000000000 \\
K &:= 5 \\
T &:= \left[14 e^{-0.7200000000 - 0.7000000000 N}, 14 - 14 e^{-0.7000000000 N} \right] \\
s &:= \emptyset \\
a &:= 0.4000000000 \\
r &:= 0.4000000000 \\
K &:= 9 \\
T &:= \left[14 e^{-0.2222222222 - 0.4000000000 N}, 14 - 14 e^{-0.4000000000 N} \right] \\
s &:= \emptyset \\
a &:= 0.1000000000 \\
r &:= 0.8000000000 \\
K &:= 9 \\
T &:= \left[14 e^{-0.05555555556 - 0.8000000000 N}, 14 - 14 e^{-0.8000000000 N} \right] \\
s &:= \emptyset \\
a &:= 0.2000000000 \\
r &:= 0.1000000000 \\
K &:= 10
\end{aligned}$$

$$\begin{aligned}
T &:= \left[14 e^{-0.08000000000 - 0.1000000000 N}, 14 - 14 e^{-0.1000000000 N} \right] \\
s &:= \{[6.647765486, 6.798561620]\} \\
&\textit{not empty} \\
a &:= 0.6000000000 \\
r &:= 0.6000000000 \\
K &:= 5 \\
T &:= \left[14 e^{-1.080000000 - 0.6000000000 N}, 14 - 14 e^{-0.6000000000 N} \right] \\
s &:= \emptyset \\
a &:= 0.1000000000 \\
r &:= 0.9000000000 \\
K &:= 9 \\
T &:= \left[14 e^{-0.05555555556 - 0.9000000000 N}, 14 - 14 e^{-0.9000000000 N} \right] \\
s &:= \emptyset \\
a &:= 0.6000000000 \\
r &:= 0.1000000000 \\
K &:= 2 \\
T &:= \left[14 e^{-3.600000000 - 0.1000000000 N}, 14 - 14 e^{-0.1000000000 N} \right] \\
s &:= \{[0.3686855290, 0.5067605745]\} \\
&\textit{not empty} \\
a &:= 0.1000000000 \\
r &:= 0.9000000000 \\
K &:= 5 \\
T &:= \left[14 e^{-0.1800000000 - 0.9000000000 N}, 14 - 14 e^{-0.9000000000 N} \right] \\
s &:= \emptyset \\
a &:= 0.2000000000 \\
r &:= 0.2000000000 \\
K &:= 5 \\
T &:= \left[14 e^{-0.3600000000 - 0.2000000000 N}, 14 - 14 e^{-0.2000000000 N} \right] \\
s &:= \{[4.209073677, 7.967010891]\} \\
&\textit{not empty} \\
a &:= 0.1000000000 \\
r &:= 0.1000000000 \\
K &:= 7
\end{aligned}$$

$$\begin{aligned}
T &:= \left[14 \, \mathrm{e}^{-0.1000000000 - 0.1000000000 \, N}, 14 - 14 \, \mathrm{e}^{-0.1000000000 \, N} \right] \\
s &:= \{[6.568190118, 6.741027297]\} \\
&\textit{not empty} \\
a &:= 0.2000000000 \\
r &:= 0.5000000000 \\
K &:= 5 \\
T &:= \left[14 \, \mathrm{e}^{-0.3600000000 - 0.5000000000 \, N}, 14 - 14 \, \mathrm{e}^{-0.5000000000 \, N} \right] \\
s &:= \emptyset \\
a &:= 0.9000000000 \\
r &:= 0.3000000000 \\
K &:= 10 \\
T &:= \left[14 \, \mathrm{e}^{-0.3600000000 - 0.3000000000 \, N}, 14 - 14 \, \mathrm{e}^{-0.3000000000 \, N} \right] \\
s &:= \emptyset \\
a &:= 0.8000000000 \\
r &:= 0.5000000000 \\
K &:= 8 \\
T &:= \left[14 \, \mathrm{e}^{-0.6000000000 - 0.5000000000 \, N}, 14 - 14 \, \mathrm{e}^{-0.5000000000 \, N} \right] \\
s &:= \emptyset \\
a &:= 0.9000000000 \\
r &:= 0.9000000000 \\
K &:= 9 \\
T &:= \left[14 \, \mathrm{e}^{-0.5000000000 - 0.9000000000 \, N}, 14 - 14 \, \mathrm{e}^{-0.9000000000 \, N} \right] \\
s &:= \emptyset \\
a &:= 1.0000000000 \\
r &:= 0.9000000000 \\
K &:= 5 \\
T &:= \left[14 \, \mathrm{e}^{-1.8000000000 - 0.9000000000 \, N}, 14 - 14 \, \mathrm{e}^{-0.9000000000 \, N} \right] \\
s &:= \{[0.9681968601, 8.142750320]\} \\
&\textit{not empty} \\
a &:= 0.4000000000 \\
r &:= 0.3000000000 \\
K &:= 6 \\
T &:= \left[14 \, \mathrm{e}^{-0.5333333333 - 0.3000000000 \, N}, 14 - 14 \, \mathrm{e}^{-0.3000000000 \, N} \right]
\end{aligned}$$

$$s := \{[3.171612683, 8.593653590]\}$$

not empty

$$a := 0.8000000000$$

$$r := 0.5000000000$$

$$K := 1$$

$$T := [14 e^{-10.40000000 - 0.5000000000 N}, 14 - 14 e^{-0.5000000000 N}]$$

$$s := \{[0.0004259640298, 0.0029814307]\}$$

not empty

$$a := 0.5000000000$$

$$r := 1.0000000000$$

$$K := 5$$

$$T := [14 e^{-0.9000000000 - 1.0000000000 N}, 14 - 14 e^{-1.0000000000 N}]$$

$$s := \emptyset$$

$$a := 0.4000000000$$

$$r := 0.6000000000$$

$$K := 3$$

$$T := [14 e^{-1.466666667 - 0.6000000000 N}, 14 - 14 e^{-0.6000000000 N}]$$

$$s := \{[1.396896327, 7.944787124]\}$$

not empty

$$a := 0.5000000000$$

$$r := 0.4000000000$$

$$K := 10$$

$$T := [14 e^{-0.2000000000 - 0.4000000000 N}, 14 - 14 e^{-0.4000000000 N}]$$

$$s := \emptyset$$

$$a := 0.7000000000$$

$$r := 0.6000000000$$

$$K := 10$$

$$T := [14 e^{-0.2800000000 - 0.6000000000 N}, 14 - 14 e^{-0.6000000000 N}]$$

$$s := \emptyset$$

$$a := 0.8000000000$$

$$r := 0.7000000000$$

$$K := 2$$

$$T := [14 e^{-4.800000000 - 0.7000000000 N}, 14 - 14 e^{-0.7000000000 N}]$$

$$s := \{[0.1069088312, 1.009463280]\}$$

not empty

$$a := 0.3000000000$$
$$r := 1.0000000000$$
$$K := 6$$
$$T := [14 e^{-0.4000000000 - 1.000000000 N}, 14 - 14 e^{-1.000000000 N}]$$
$$S := \emptyset$$
$$a := 0.8000000000$$
$$r := 0.4000000000$$
$$K := 6$$
$$T := \left[14 e^{-1.066666667 - 0.4000000000 N}, 14 - 14 e^{-0.4000000000 N} \right]$$
$$s := \{[2.089119702, 7.929691370]\}$$

not empty

$$a := 0.3000000000$$
$$r := 0.7000000000$$
$$K := 10$$
$$T := \left[14 e^{-0.1200000000 - 0.7000000000 N}, 14 - 14 e^{-0.7000000000 N} \right]$$
$$S := \emptyset$$
$$a := 1.0000000000$$
$$r := 0.5000000000$$
$$K := 5$$
$$T := \left[14 e^{-1.800000000 - 0.500000000 N}, 14 - 14 e^{-0.500000000 N} \right]$$
$$s := \{ [1.243022627, 6.480151315] \}$$

not empty

(14)

```
> `not empty`, ne, `times`
```

not empty, 68, times

(15)