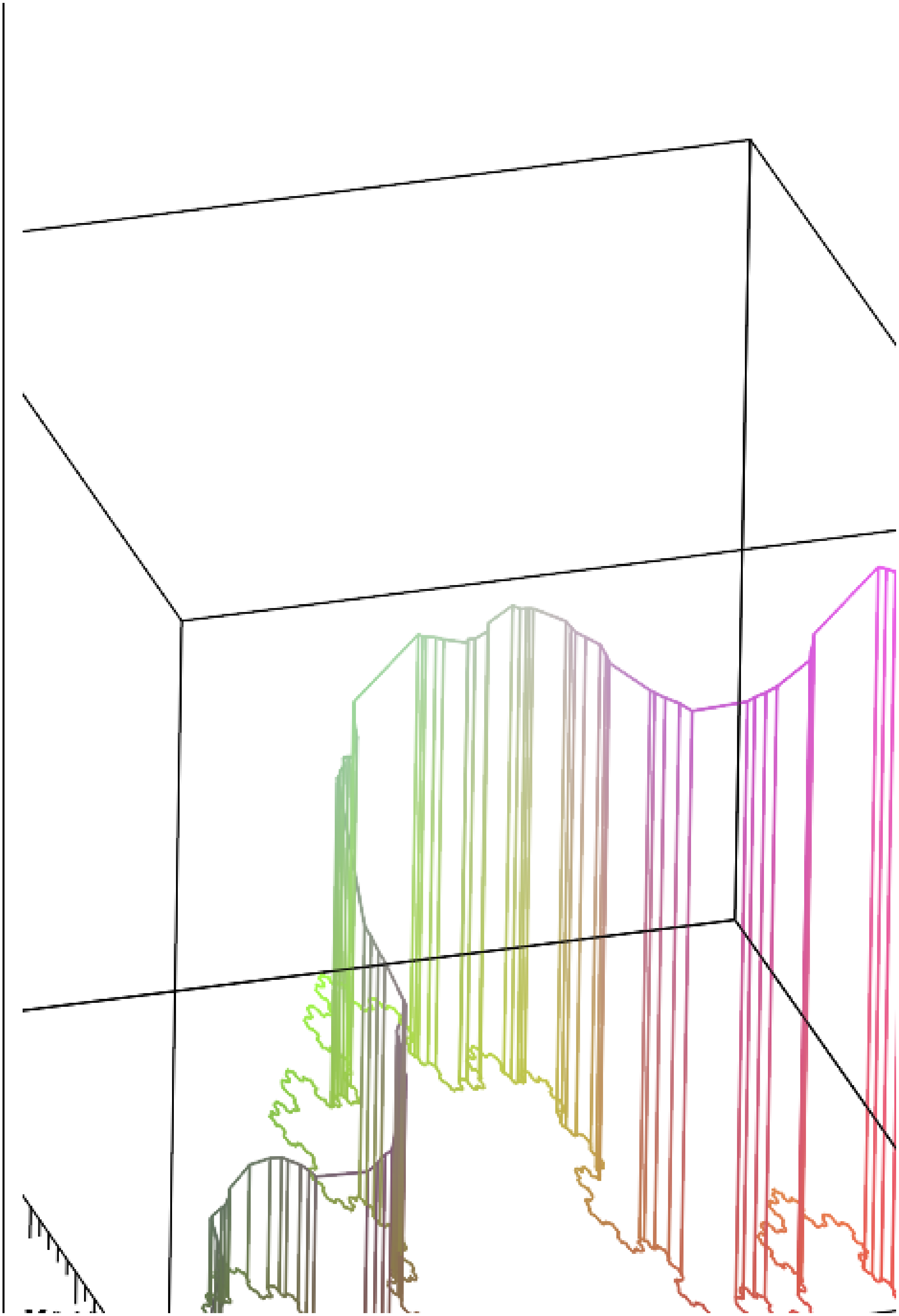
```
> restart:


  with(plots):

  #       !
     ,
  #          ,          0 . 1   0 . 0 5
  0.01  0.005
  ChZnPoZap:=3:
  ShagX:=evalf[1](1/10^ChZnPoZap);


  #
  Theta[0]:=0:
  Theta[1]:=Pi/3:
  Theta[2]:=-Pi/3:
  Theta[3]:=0:

  #
  for i from 0 to 3 do
  s[i]:=1/3:
  T[i]:=matrix(2,2,[s[i]*cos(Theta[i]),-s[i]*sin(Theta[i]),s[i]*sin
  (Theta[i]),s[i]*cos(Theta[i])]):
  end do:
  #
  v0:=matrix(2,1,[1,0]):


  #
  for j from 0 to 3 do
  A[j]:=evalf(evalm(add(evalm(T[i]&*v0),i=0..j))[1,1]);
  B[j]:=evalf(evalm(add(evalm(T[i]&*v0),i=0..j))[2,1]);
  C[j]:=evalf(s[j]*cos(Theta[j])):
  E[j]:=evalf(s[j]*sin(Theta[j])):
  end do:
  A[-1]:=0:
  B[-1]:=0:
  C[-1]:=0:
  E[-1]:=0:


  #
  KoxaPlolnostu:= proc(t)
  local zz,i,eq1,eq2,j,jj,TT:

  #
  ,         t
  j:=1:
  zz[1]:=0:
  while zz[j]<1+t do
  eq1[j],eq2[j],TT[j]:=KoxaUrav(zz[j]):
  zz[j+1]:=zz[j]+t:
  j:=j+1:
  end do:
```

```
#

subs(x[0.]=0,y[0.]=0,solve({seq(eq1[jj],jj=1..j-1),seq(eq2[jj],
jj=1..j-1)},{seq(x[zz[jj]],jj=1..j-1),seq(y[zz[jj]],jj=1..j-1)}))
;

#    x , y      t
subs(%,[seq([x[zz[jj]],y[zz[jj]],zz[jj]],jj=1..j-1)]);
end proc:

#
  t
KoxaUrav := proc(t)
option remember;
local eq1,eq2,i,T,qq,k:
T:=t:
#
k:=4:
qq:=k*T-trunc(k*T):
eq1:=x[t]=A[trunc(k*T)-1]+C[trunc(k*T)]*x[qq]-E[trunc(k*T)]*y[qq]
:
eq2:=y[t]=B[trunc(k*T)-1]+E[trunc(k*T)]*x[qq]+C[trunc(k*T)]*y[qq]
:
eq1,eq2,T;
end proc:
SaveFractalNotWar:=KoxaPlolnostu(ShagX):
ChisloUzlovFractala:=nops(SaveFractalNotWar)-1:

KoxaFunction:= proc(t)
option remember;
local i:

for i from 0 to ChisloUzlovFractala do
#print(i/ChisloUzlovFractala):
if t=i/ChisloUzlovFractala then
RETURN([SaveFractalNotWar[i+1,1],SaveFractalNotWar[i+1,2]]);
fi:
od:
NULL:
end proc:

with(Statistics):


#      = 0 . 1 ,   9 7
SubdivizionTrue:={0, 0.25e-1, 0.28000e-1, 0.35000e-1, 0.38000e-1,
0.39000e-1, 0.86000e-1, 0.87000e-1, 0.90000e-1, 0.97000e-1,
0.98000e-1, .10500, .10700, .11100, .11200, .11300, .13600,
.14700, .15100, .15300, .15900, .16200, .16400, .21100, .21500,
.22200, .22500, .27500, .27600, .27800, .28500, .28600, .28800,
.28900, .30400, .30500, .30500, .32000, .32200, .32600, .32800,
.42200, .42300, .42400, .42700, .42900, .43100, .43200, .44300,
.44800, .45100, .45300, .54700, .54800, .54900, .55300, .55500,
.56900, .57000, .57200, .58000, .58200, .60600, .60800, .61100,
.61200, .61300, .63700, .63900, .64200, .64500, .65200, .66000,
.66300, .66400, .71100, .71200, .71500, .72200, .72600, .77500,
.77800, .78500, .78900, .82000, .82100, .82200, .82600, .82800,
.92200, .92400, .92700, .93100, .94500, .94700, .95600, .98, 1.0}
:
N:=97:

for i from 2 to N do
sigma[i]:=add(evalf((sqrt((KoxaFunction(SubdivizionTrue[jj+1])[1]
-KoxaFunction(SubdivizionTrue[jj])[1])^2+(KoxaFunction
(SubdivizionTrue[jj+1])[2]-KoxaFunction(SubdivizionTrue[jj])[2])
^2))^(ln(4)/ln(3))),jj=1..i-1)/evalf(GAMMA(ln(4)/ln(3)+1)):
od:
```

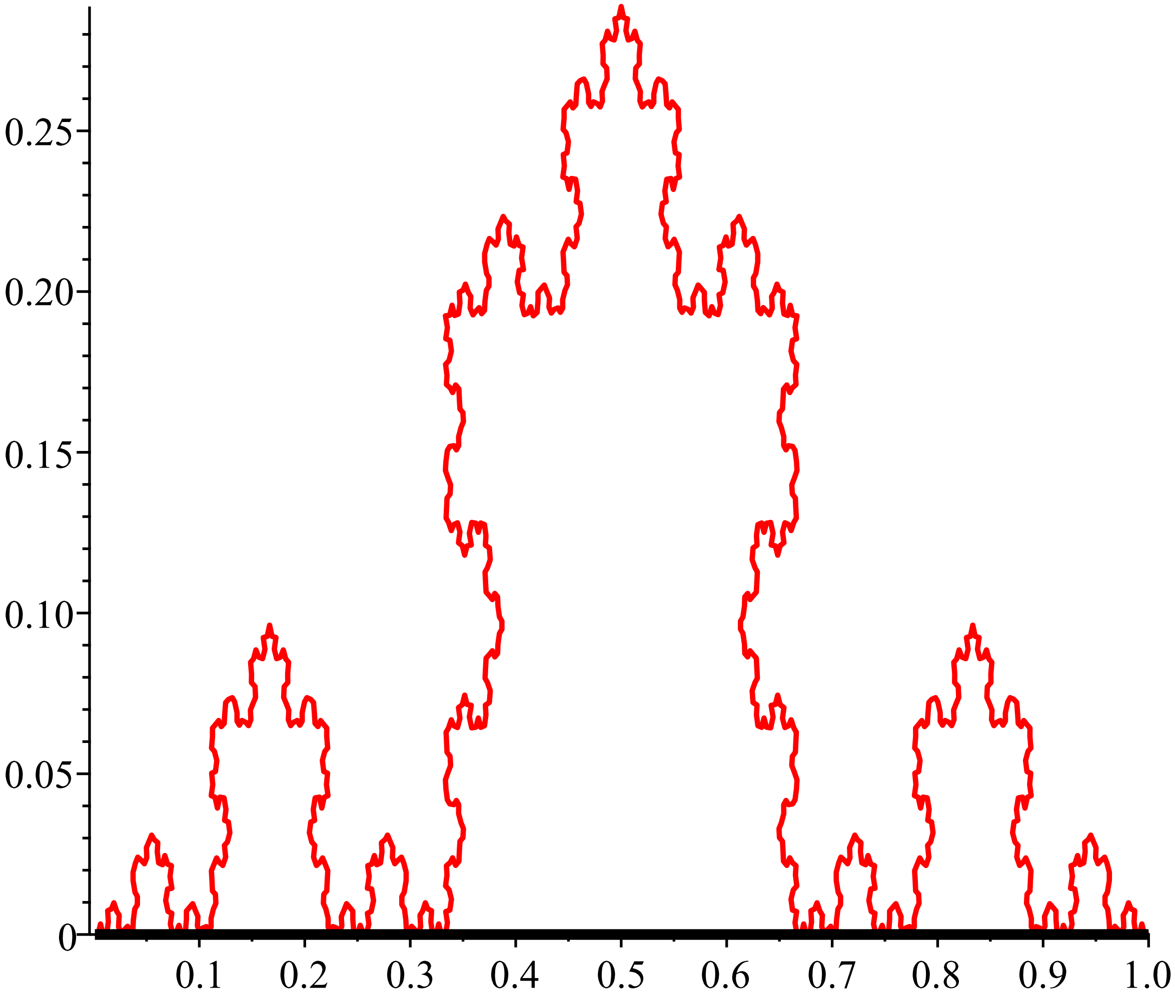
$$ShagX := 0.001 \qquad (1)$$

```
> PlotP := pointplot3d([[0,0,0],seq([KoxaFunction(SubdivizionTrue
[ss])[1],KoxaFunction(SubdivizionTrue[ss])[2],sigma[ss]], ss = 2
.. N)], labels = [x, y,typeset("%1",S(z)[F]^(alpha)) ],labelfont
= ["Verdana",bold, 14],connect=true):
PlotFract := pointplot3d([seq([KoxaFunction(ss/1000)[1],
KoxaFunction(ss/1000)[2],0], ss = 1 .. 1000)], labels = [x, y,
typeset("%1",p(theta))],labelfont = ["Verdana",bold, 14],connect=
true):

for ss from 2 to N do
PlotPalka[ss] := pointplot3d([[KoxaFunction(SubdivizionTrue[ss])
[1],KoxaFunction(SubdivizionTrue[ss])[2],sigma[ss]],[KoxaFunction
(SubdivizionTrue[ss])[1],KoxaFunction(SubdivizionTrue[ss])[2],0]
], labels = [x, y, typeset("%1",p(theta))],labelfont =
["Verdana",bold, 14],connect=true):
od:
display(PlotP,PlotFract,seq(PlotPalka[ss],ss=2..N));
```



```
q:=plot([seq([KoxaFunction(ss/1000)[1],KoxaFunction(ss/1000)[2]],
ss = 1 .. 1000)],thickness=2,color=red);
r:=plot([seq([ss/1000,0],ss = 1 .. 1000)],thickness=4,color=
black);
p:=plot(t,t=0..1);
display(q,r);
```

```
q := PLOT(...)
r := PLOT(...)
p := PLOT(...)
```



```
> f:=exp(x);
  A:='A':
  eq:=A*f+B:
  solve({subs(x=0,f)=subs(x=0,eq),subs(x=sigma[N],f)=subs(x=1,eq)})
  ;sol:=%[1],%[2];



  evalf(subs(x=sigma[N],f));

  q:=plot([[0,subs(x=0,f)],seq([SubdivizionTrue[ss],subs(x=sigma
[ss],f)],ss=2..N)],labels = [z, 'p'],labelfont = ["Verdana",bold,
14],color=red,legend = "  ",      legendstyle = [font =
["Verdana",bold, 14]]);
r:=plot([[0,subs(x=0,f)],seq([SubdivizionTrue[ss],subs(sol,A*subs
(x=SubdivizionTrue[ss],f)+B)],ss=2..N)],labels = [x, 'p'],
labelfont = ["Verdana",bold, 14],color=black,legend =
"  ",legendstyle = [font = [       "Verdana",bold, 20]]
);
p:=plot([seq([SubdivizionTrue[ss],(subs(x=sigma[ss],f)-subs(sol,
A*subs(x=SubdivizionTrue[ss],f)+B))/(subs(x=1,f)-subs(x=0,f))],
ss=2..N)],labels = [z, 'p'],labelfont = ["Verdana",bold, 14]);

display(q,r);
display(p);
```

$$f := \mathrm{e}^{x}$$

$$\{A = 0.3264885917, B = 0.6735114083\}$$

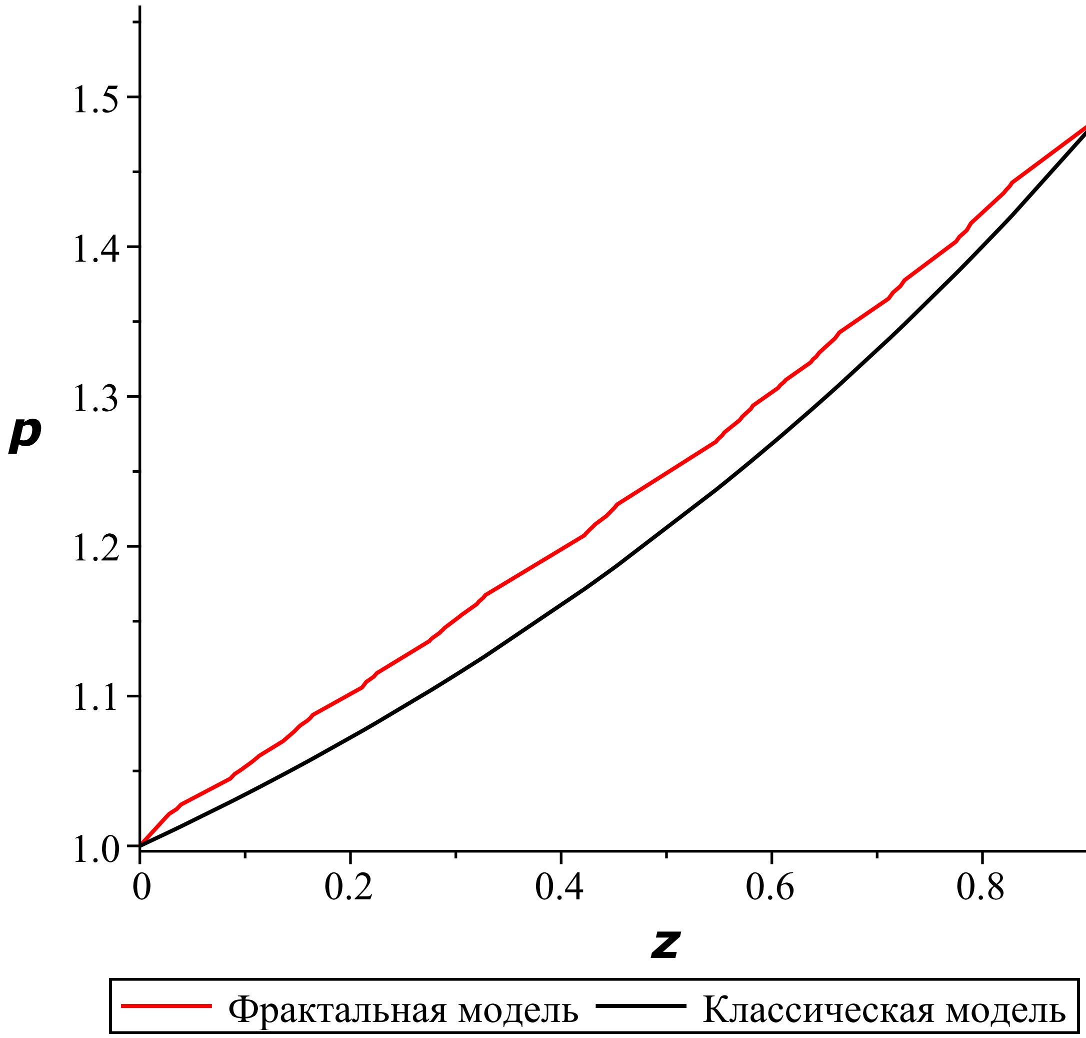
$$sol := A = 0.3264885917, B = 0.6735114083$$

$$1.560999414$$

$$q := PLOT(\ldots)$$

$$r := PLOT(\ldots)$$

```
Error, recursive assignment
```



```
Error, (in plots:-display) expecting plot structure but 
received: p
```

```
> 0.51/evalf(GAMMA(ln(4)/ln(3)+1))
```

```
Warning, inserted missing semicolon at end of statement
```

$$0.4470675862 \qquad (2)$$

```
> [seq([SubdivizionTrue[ss],subs(sol,A*subs(x=SubdivizionTrue[ss],
  f)+B)],ss=2..N)]
```

```
Warning, inserted missing semicolon at end of statement
```

$$[[0.025, 0.3852607097\ e^{0.025}+0.6147392903], [0.028000, 0.3852607097\ e^{0.028000}+0.6147392903], [0.035000, 0.3852607097\ e^{0.035000}+0.6147392903], [0.038000, 0.3852607097\ e^{0.038000}+0.6147392903], [0.039000, 0.3852607097\ e^{0.039000}+0.6147392903], [0.086000, 0.3852607097\ e^{0.086000}+0.6147392903], [0.087000, 0.3852607097\ e^{0.087000}+0.6147392903], [0.090000, 0.3852607097\ e^{0.090000}+0.6147392903], [0.097000, 0.3852607097\ e^{0.097000}+0.6147392903], [0.098000, 0.3852607097\ e^{0.098000}+0.6147392903], [0.10500, 0.3852607097\ e^{0.10500}+0.6147392903], [0.10700, 0.3852607097\ e^{0.10700}+0.6147392903], [0.11100, 0.3852607097\ e^{0.11100}+0.6147392903], [0.11200, 0.3852607097\ e^{0.11200}+0.6147392903], \qquad (3)$$

$[0.11300, 0.3852607097\, e^{0.11300}+0.6147392903], [0.13600, 0.3852607097\, e^{0.13600}$
$+0.6147392903], [0.14700, 0.3852607097\, e^{0.14700}+0.6147392903], [0.15100,$
$0.3852607097\, e^{0.15100}+0.6147392903], [0.15300, 0.3852607097\, e^{0.15300}+0.6147392903],$
$[0.15900, 0.3852607097\, e^{0.15900}+0.6147392903], [0.16200, 0.3852607097\, e^{0.16200}$
$+0.6147392903], [0.16400, 0.3852607097\, e^{0.16400}+0.6147392903], [0.21100,$
$0.3852607097\, e^{0.21100}+0.6147392903], [0.21500, 0.3852607097\, e^{0.21500}+0.6147392903],$
$[0.22200, 0.3852607097\, e^{0.22200}+0.6147392903], [0.22500, 0.3852607097\, e^{0.22500}$
$+0.6147392903], [0.27500, 0.3852607097\, e^{0.27500}+0.6147392903], [0.27600,$
$0.3852607097\, e^{0.27600}+0.6147392903], [0.27800, 0.3852607097\, e^{0.27800}+0.6147392903],$
$[0.28500, 0.3852607097\, e^{0.28500}+0.6147392903], [0.28600, 0.3852607097\, e^{0.28600}$
$+0.6147392903], [0.28800, 0.3852607097\, e^{0.28800}+0.6147392903], [0.28900,$
$0.3852607097\, e^{0.28900}+0.6147392903], [0.30400, 0.3852607097\, e^{0.30400}+0.6147392903],$
$[0.30500, 0.3852607097\, e^{0.30500}+0.6147392903], [0.32000, 0.3852607097\, e^{0.32000}$
$+0.6147392903], [0.32200, 0.3852607097\, e^{0.32200}+0.6147392903], [0.32600,$
$0.3852607097\, e^{0.32600}+0.6147392903], [0.32800, 0.3852607097\, e^{0.32800}+0.6147392903],$
$[0.42200, 0.3852607097\, e^{0.42200}+0.6147392903], [0.42300, 0.3852607097\, e^{0.42300}$
$+0.6147392903], [0.42400, 0.3852607097\, e^{0.42400}+0.6147392903], [0.42700,$
$0.3852607097\, e^{0.42700}+0.6147392903], [0.42900, 0.3852607097\, e^{0.42900}+0.6147392903],$
$[0.43100, 0.3852607097\, e^{0.43100}+0.6147392903], [0.43200, 0.3852607097\, e^{0.43200}$
$+0.6147392903], [0.44300, 0.3852607097\, e^{0.44300}+0.6147392903], [0.44800,$
$0.3852607097\, e^{0.44800}+0.6147392903], [0.45100, 0.3852607097\, e^{0.45100}+0.6147392903],$
$[0.45300, 0.3852607097\, e^{0.45300}+0.6147392903], [0.54700, 0.3852607097\, e^{0.54700}$
$+0.6147392903], [0.54800, 0.3852607097\, e^{0.54800}+0.6147392903], [0.54900,$
$0.3852607097\, e^{0.54900}+0.6147392903], [0.55300, 0.3852607097\, e^{0.55300}+0.6147392903],$
$[0.55500, 0.3852607097\, e^{0.55500}+0.6147392903], [0.56900, 0.3852607097\, e^{0.56900}$
$+0.6147392903], [0.57000, 0.3852607097\, e^{0.57000}+0.6147392903], [0.57200,$
$0.3852607097\, e^{0.57200}+0.6147392903], [0.58000, 0.3852607097\, e^{0.58000}+0.6147392903],$
$[0.58200, 0.3852607097\, e^{0.58200}+0.6147392903], [0.60600, 0.3852607097\, e^{0.60600}$
$+0.6147392903], [0.60800, 0.3852607097\, e^{0.60800}+0.6147392903], [0.61100,$
$0.3852607097\, e^{0.61100}+0.6147392903], [0.61200, 0.3852607097\, e^{0.61200}+0.6147392903],$
$[0.61300, 0.3852607097\, e^{0.61300}+0.6147392903], [0.63700, 0.3852607097\, e^{0.63700}$
$+0.6147392903], [0.63900, 0.3852607097\, e^{0.63900}+0.6147392903], [0.64200,$
$0.3852607097\, e^{0.64200}+0.6147392903], [0.64500, 0.3852607097\, e^{0.64500}+0.6147392903],$
$[0.65200, 0.3852607097\, e^{0.65200}+0.6147392903], [0.66000, 0.3852607097\, e^{0.66000}$
$+0.6147392903], [0.66300, 0.3852607097\, e^{0.66300}+0.6147392903], [0.66400,$
$0.3852607097\, e^{0.66400}+0.6147392903], [0.71100, 0.3852607097\, e^{0.71100}+0.6147392903],$

$[0.71200, 0.3852607097\ \mathrm{e}^{0.71200}+0.6147392903], [0.71500, 0.3852607097\ \mathrm{e}^{0.71500}$
$+0.6147392903], [0.72200, 0.3852607097\ \mathrm{e}^{0.72200}+0.6147392903], [0.72600,$
$0.3852607097\ \mathrm{e}^{0.72600}+0.6147392903], [0.77500, 0.3852607097\ \mathrm{e}^{0.77500}+0.6147392903],$
$[0.77800, 0.3852607097\ \mathrm{e}^{0.77800}+0.6147392903], [0.78500, 0.3852607097\ \mathrm{e}^{0.78500}$
$+0.6147392903], [0.78900, 0.3852607097\ \mathrm{e}^{0.78900}+0.6147392903], [0.82000,$
$0.3852607097\ \mathrm{e}^{0.82000}+0.6147392903], [0.82100, 0.3852607097\ \mathrm{e}^{0.82100}+0.6147392903],$
$[0.82200, 0.3852607097\ \mathrm{e}^{0.82200}+0.6147392903], [0.82600, 0.3852607097\ \mathrm{e}^{0.82600}$
$+0.6147392903], [0.82800, 0.3852607097\ \mathrm{e}^{0.82800}+0.6147392903], [0.92200,$
$0.3852607097\ \mathrm{e}^{0.92200}+0.6147392903], [0.92400, 0.3852607097\ \mathrm{e}^{0.92400}+0.6147392903],$
$[0.92700, 0.3852607097\ \mathrm{e}^{0.92700}+0.6147392903], [0.93100, 0.3852607097\ \mathrm{e}^{0.93100}$
$+0.6147392903], [0.94500, 0.3852607097\ \mathrm{e}^{0.94500}+0.6147392903], [0.94700,$
$0.3852607097\ \mathrm{e}^{0.94700}+0.6147392903], [0.95600, 0.3852607097\ \mathrm{e}^{0.95600}+0.6147392903],$
$[0.98, 0.3852607097\ \mathrm{e}^{0.98}+0.6147392903], [1.0, 0.3852607097\ \mathrm{e}^{1.0}+0.6147392903]]$

```
> sol
```

$$A = 0.3852607097, B = 0.6147392903 \qquad \textbf{(4)}$$

```
>
```