```
> with(plots):x1:=0.2;x2:=0.3;x3:=0.5;
```

$$x1 := 0.2$$

$$x2 := 0.3$$

$$x3 := 0.5$$

```
> RE1:=x1*log(x1/p1)+x2*log(x2/p2)+x3*log(x3/p3);#Entropy with first arg
fixed
```

$$RE1 := 0.2\ \ln\left(\frac{0.2}{p1}\right) + 0.3\ \ln\left(\frac{0.3}{p2}\right) + 0.5\ \ln\left(\frac{0.5}{p3}\right)$$

```
> RE2:=p1*log(p1/x1)+p2*log(p2/x2)+p3*log(p3/x3);#Entropy with second arg
fixed
```

$$RE2 := p1\ \ln(5.000000000\ p1) + p2\ \ln(3.333333333\ p2) + p3\ \ln(2.000000000\ p3)$$

```
> pi3:=2*y/sqrt(3);pi2:=x-y/sqrt(3);pi1:=1-pi2-pi3;#Mapping triangle to
simplex
```

$$\pi 3 := \frac{2}{3} y \sqrt{3}$$

$$\pi 2 := x - \frac{1}{3} y \sqrt{3}$$

$$\pi 1 := 1 - x - \frac{1}{3} y \sqrt{3}$$

```
> Eplot1:=contourplot(subs(p1=pi1,p2=pi2,p3=pi3,RE1),x=0..1,y=0..sqrt(3)
/2,contours=[0.01,0.05,0.1,0.2,0.3,0.4,0.5,0.8],grid=[100,100],color=blacl
```

```
> Eplot2:=contourplot(subs(p1=pi1,p2=pi2,p3=pi3,RE2),x=0..1,y=0..sqrt(3)
/2,contours=[0.01,0.05,0.1,0.2,0.3,0.4,0.5,0.8],grid=[200,200],color=blacl
```

```
> SQ:=(x1-p1)^2+(x2-p2)^2+(x3-p3)^2;
```

$$SQ := (0.2 - p1)^2 + (0.3 - p2)^2 + (0.5 - p3)^2$$

```
> Eplot3:=contourplot(subs(p1=pi1,p2=pi2,p3=pi3,SQ),x=0..1,y=0..sqrt(3)/
2,contours=[0.01,0.05,0.1,0.2,0.3,0.4,0.5,0.6],grid=[100,100],color=black,
```

```
> alpha1:=0.5-0.3*alpha;alpha2:=0.5-0.2*alpha;alpha3:=0.5*alpha;
```

$$\alpha 1 := 0.5 - 0.3\ \alpha$$

$$\alpha 2 := 0.5 - 0.2\ \alpha$$

$$\alpha 3 := 0.5\ \alpha$$

```
> RD1:=subs(p1=alpha1,p2=alpha2,p3=alpha3,RE1);
```

$$RD1 := 0.2\ \ln\left(\frac{0.2}{0.5 - 0.3\ \alpha}\right) + 0.3\ \ln\left(\frac{0.3}{0.5 - 0.2\ \alpha}\right) + 0.5\ \ln\left(\frac{1.000000000}{\alpha}\right)$$

```
> RD2:=subs(p1=alpha1,p2=alpha2,p3=alpha3,RE2);
```

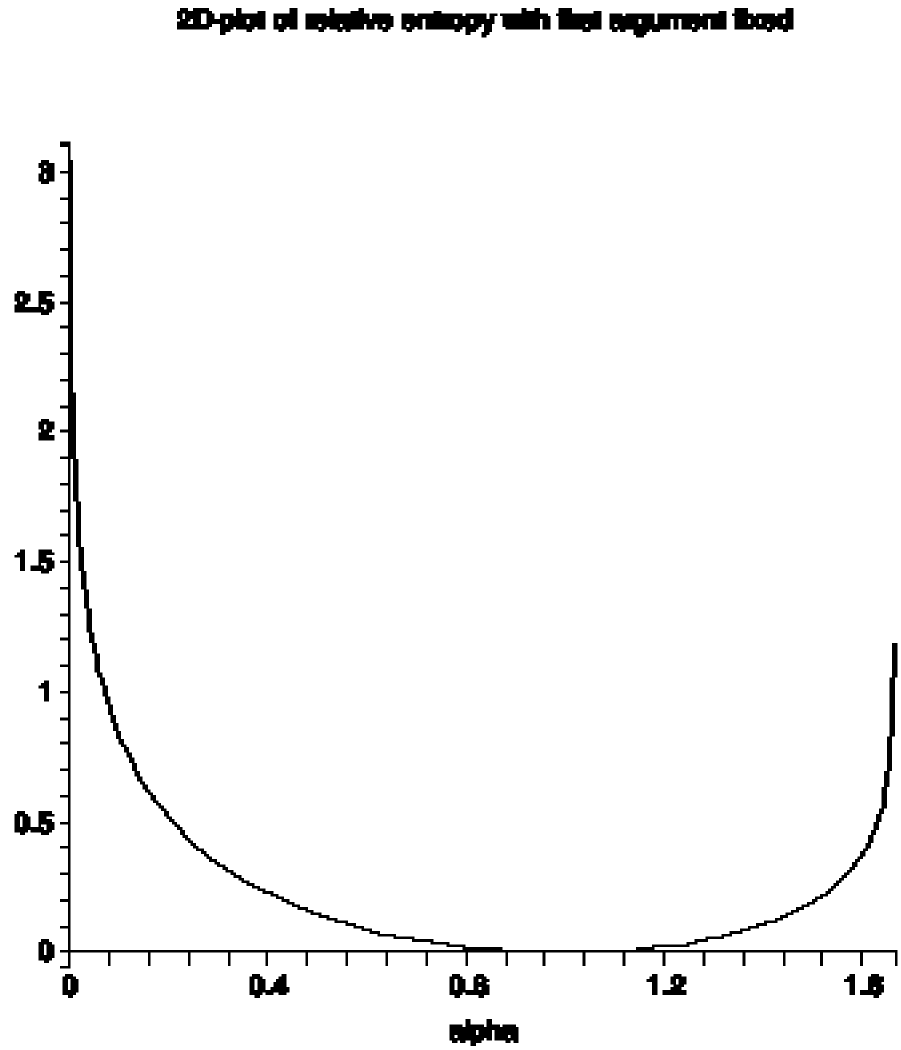
$$RD2 := (0.5 - 0.3\ \alpha)\ \ln(2.500000000 - 1.500000000\ \alpha) + (0.5 - 0.2\ \alpha)\ \ln(1.666666666 - 0.6666666666\ \alpha)$$

$$+ 0.5\,\alpha \ln(1.000000000\,\alpha)$$

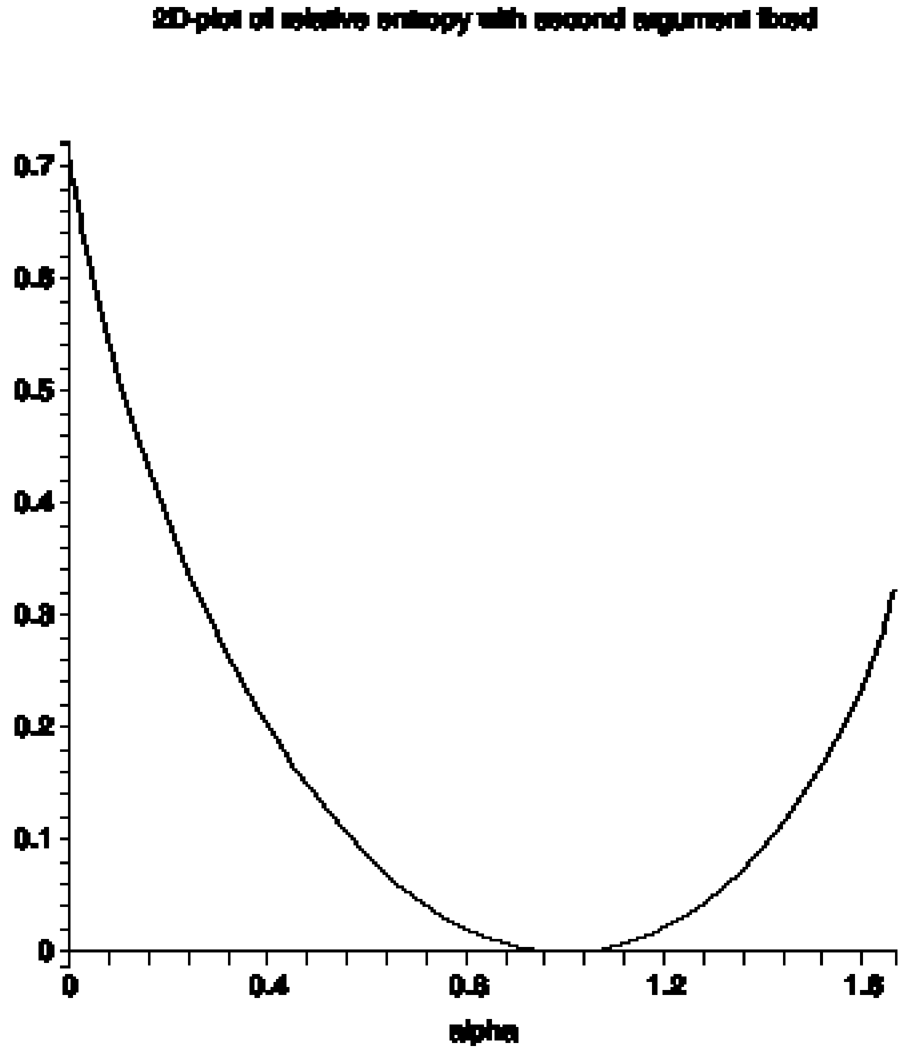
```
> SD:=subs(p1=alpha1,p2=alpha2,p3=alpha3,SQ);
```

$$SD := (-0.3 + 0.3\,\alpha)^2 + (-0.2 + 0.2\,\alpha)^2 + (0.5 - 0.5\,\alpha)^2$$

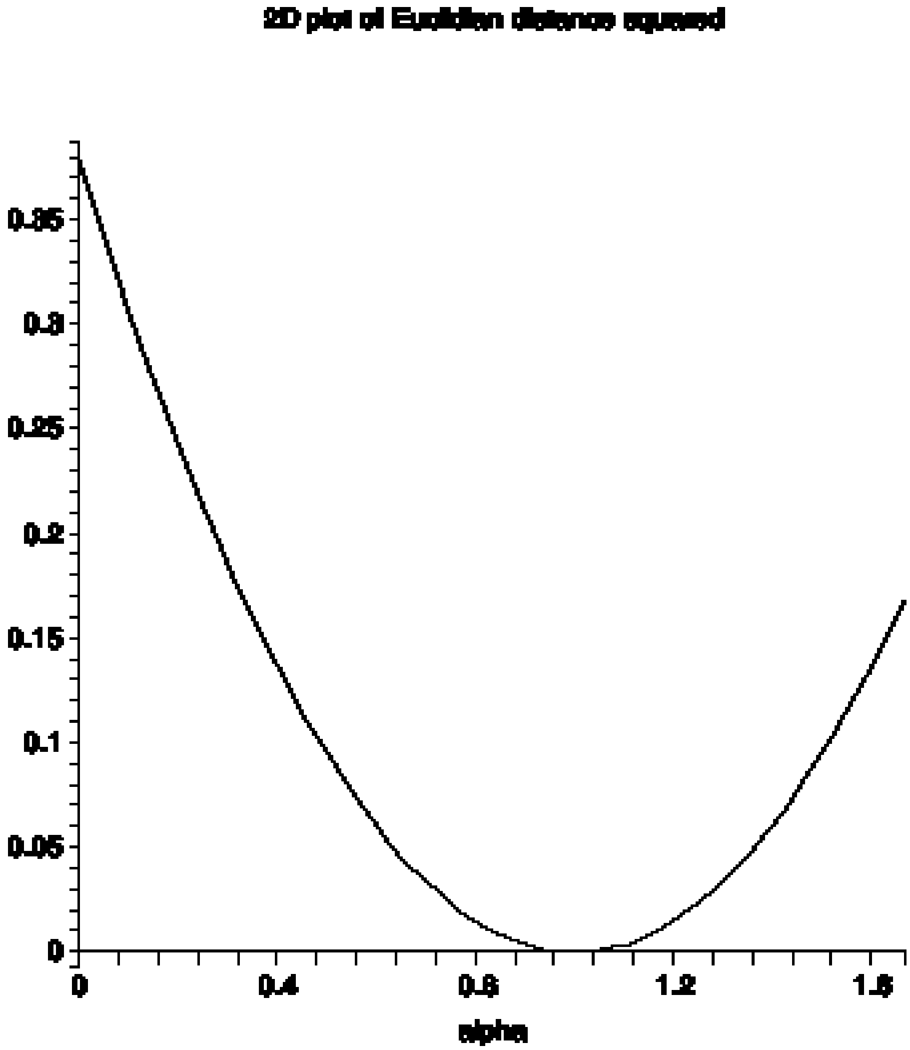
```
> plot(RD1,alpha=0..5/3,color=black,thickness=2,title="2D-plot of relative
  entropy with first argument fixed");
```




```
> plot(RD2,alpha=0..5/3,color=black,thickness=2,title="2D-plot of relative
  entropy with second argument fixed");
```

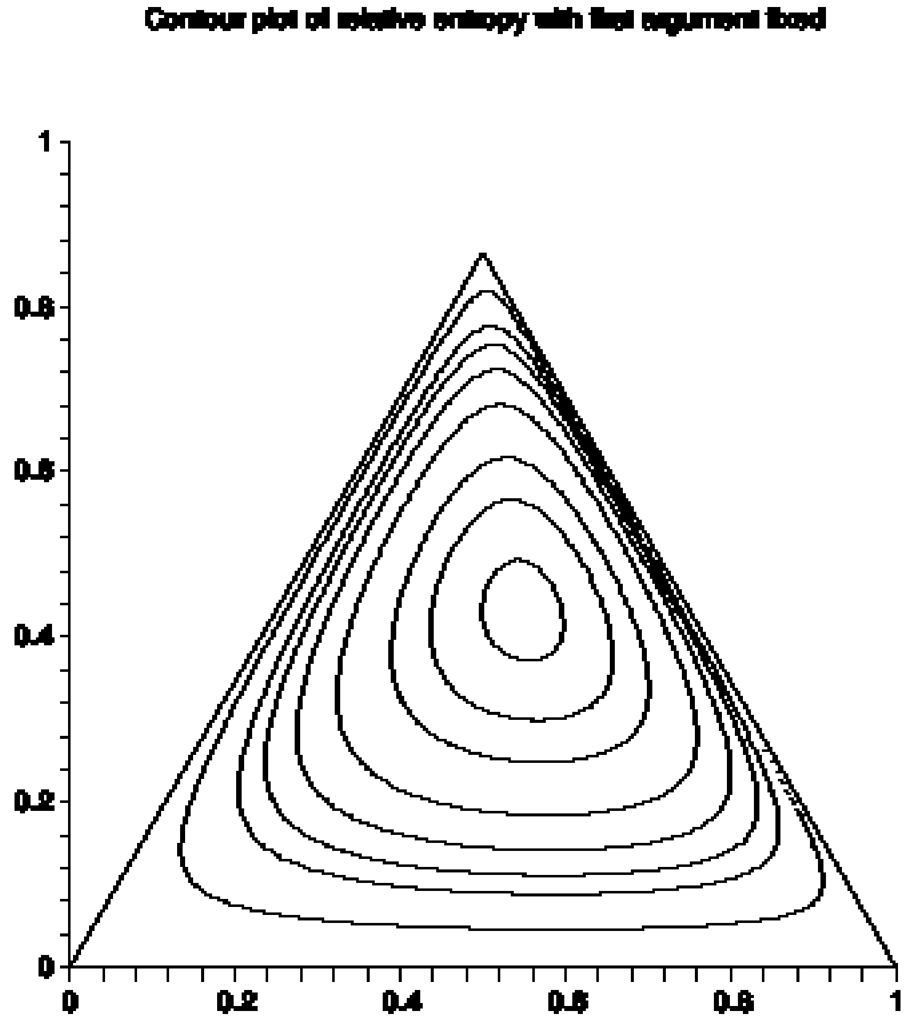



```
> plot(SD,alpha=0..5/3,color=black,thickness=2,title="2D plot of Euclidian
  distance squared");
```

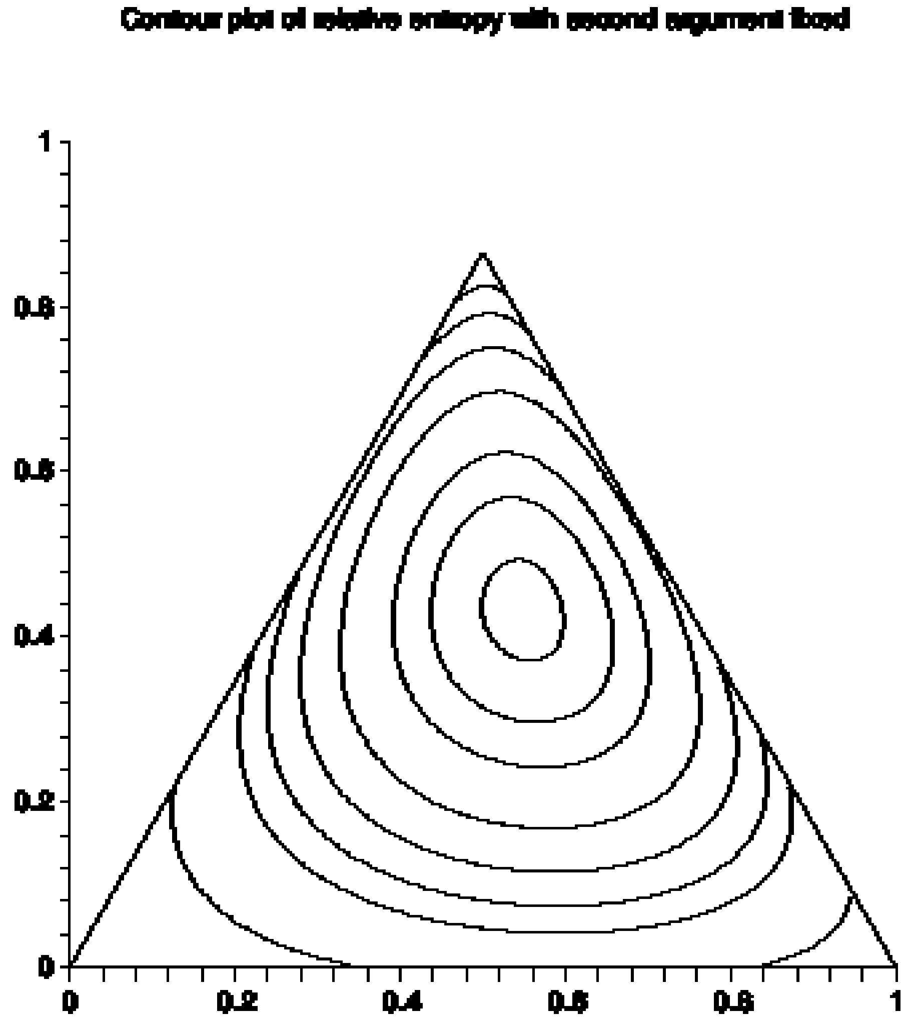



```
> Tr:=plot([[0,0],[1/2,sqrt(3)/2],[1,0],[0,0]],0..1,0..1,thickness=3,color=b
```

```
> plots[display](Tr,Eplot1);
```

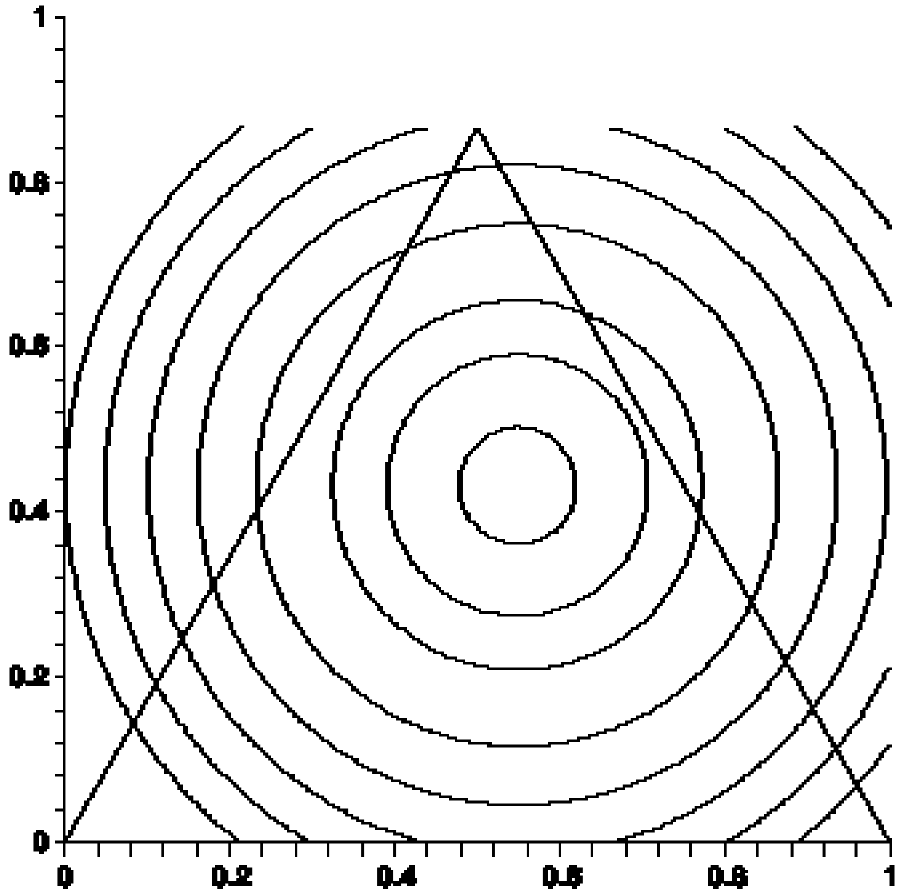



```
> plots[display](Tr,Eplot2);
```




```
> plots[display](Tr,Eplot3);
```

Contour plot of Euclidian distance squared




```
> di1:=alpha*d11+(1-alpha)*d12;di2:=alpha*d21+(1-alpha)*d22;di3:=alpha*d31+(
```

$$di1 := \alpha\, d11 + (1 - \alpha)\, d12$$

$$di2 := \alpha\, d21 + (1 - \alpha)\, d22$$

$$di3 := \alpha\, d31 + (1 - \alpha)\, d32$$

```
> Z:=d11^alpha*d12^(1-alpha)+d21^alpha*d22^(1-alpha)+d31^alpha*d32^(1-alpha)
```

$$Z := d11^{\alpha}\, d12^{(1 - \alpha)} + d21^{\alpha}\, d22^{(1 - \alpha)} + d31^{\alpha}\, d32^{(1 - \alpha)}$$

$$de1 := \frac{d11^{\alpha}\, d12^{(1 - \alpha)}}{d11^{\alpha}\, d12^{(1 - \alpha)} + d21^{\alpha}\, d22^{(1 - \alpha)} + d31^{\alpha}\, d32^{(1 - \alpha)}}$$

$$de2 := \frac{d21^{\alpha}\, d22^{(1 - \alpha)}}{d11^{\alpha}\, d12^{(1 - \alpha)} + d21^{\alpha}\, d22^{(1 - \alpha)} + d31^{\alpha}\, d32^{(1 - \alpha)}}$$

$$de3 := \frac{d31^{\alpha}\, d32^{(1-\alpha)}}{d11^{\alpha}\, d12^{(1-\alpha)} + d21^{\alpha}\, d22^{(1-\alpha)} + d31^{\alpha}\, d32^{(1-\alpha)}}$$

```
> xi:=di2+(1/2)*di3; yi:=sqrt(3)/2*di3;#Mapping simplex to triangle
```

$$\xi := \alpha\, d21 + (1-\alpha)\, d22 + \frac{1}{2}\alpha\, d31 + \frac{1}{2}(1-\alpha)\, d32$$

$$yi := \frac{1}{2}\sqrt{3}\,(\alpha\, d31 + (1-\alpha)\, d32)$$

```
> xe:=de2+(1/2)*de3; ye:=sqrt(3)/2*de3;#Mapping simplex to triangle
```

$$xe := \frac{d21^{\alpha}\, d22^{(1-\alpha)}}{d11^{\alpha}\, d12^{(1-\alpha)} + d21^{\alpha}\, d22^{(1-\alpha)} + d31^{\alpha}\, d32^{(1-\alpha)}} + \frac{d31^{\alpha}\, d32^{(1-\alpha)}}{2\left(d11^{\alpha}\, d12^{(1-\alpha)} + d21^{\alpha}\, d22^{(1-\alpha)} + d31^{\alpha}\, d32^{(1-\alpha)}\right)}$$

$$ye := \frac{\sqrt{3}\, d31^{\alpha}\, d32^{(1-\alpha)}}{2\left(d11^{\alpha}\, d12^{(1-\alpha)} + d21^{\alpha}\, d22^{(1-\alpha)} + d31^{\alpha}\, d32^{(1-\alpha)}\right)}$$

```
> a1:=0.05;a2:=0.9;a3:=0.05;b1:=0.6;b2:=0.1;b3:=0.3;
```

$$a1 := 0.05$$

$$a2 := 0.9$$

$$a3 := 0.05$$

$$b1 := 0.6$$

$$b2 := 0.1$$

$$b3 := 0.3$$

```
> c1:=0.1;c2:=0.1;c3:=0.8;d1:=0.1;d2:=0.7;d3:=0.2;
```

$$c1 := 0.1$$

$$c2 := 0.1$$

$$c3 := 0.8$$

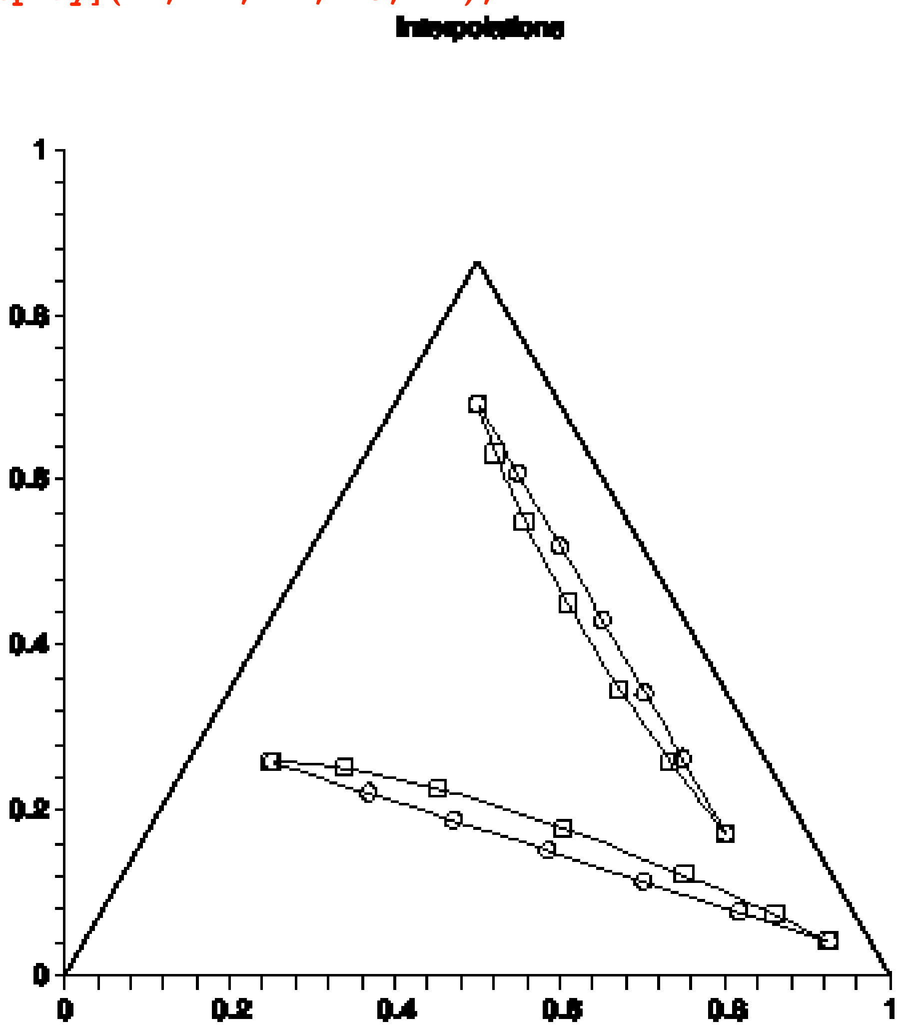
$$d1 := 0.1$$

$$d2 := 0.7$$

$$d3 := 0.2$$

```
> IP1:=plot([[subs(d11=a1,d21=a2,d31=a3,d12=b1,d22=b2,d32=b3,xe),subs(d11=a1
  =a2,d31=a3,d12=b1,d22=b2,d32=b3,xi),subs(d11=a1,d21=a2,d31=a3,d12=b1,d22
  =b2,d32=b3,yi),alpha=0..1]],style=point,color=black,symbol=[box,circle],
      symbolsize=20,adaptive=false,numpoints=7,title="Interpolations"):
```

```
> IP2:=plot([[subs(d11=c1,d21=c2,d31=c3,d12=d1,d22=d2,d32=d3,xe),subs(d11=c1
  =c2,d31=c3,d12=d1,d22=d2,d32=d3,xi),subs(d11=c1,d21=c2,d31=c3,d12=d1,d22
  =d2,d32=d3,yi),alpha=0..1]],style=point,color=black,symbol=[box,circle],sy
> IP3:=plot([[subs(d11=a1,d21=a2,d31=a3,d12=b1,d22=b2,d32=b3,xe),subs(d11=a1
  =a2,d31=a3,d12=b1,d22=b2,d32=b3,xi),subs(d11=a1,d21=a2,d31=a3,d12=b1,d22
  =b2,d32=b3,yi),alpha=0..1]],style=line,numpoints=3,color=black,symbol=[box
> IP4:=plot([[subs(d11=c1,d21=c2,d31=c3,d12=d1,d22=d2,d32=d3,xe),subs(d11=c1
  =c2,d31=c3,d12=d1,d22=d2,d32=d3,xi),subs(d11=c1,d21=c2,d31=c3,d12=d1,d22
  =d2,d32=d3,yi),alpha=0..1]],style=line,color=black,symbol=[box,circle],thi
> plots[display](Tr,IP2,IP1,IP3,IP4);
```




```
>
```