Pallojen leikkauspiste x, y, z:

$$\begin{cases} (x-x_1)^2+(y-y_1)^2+(z-z_1)^2=r_1^2 \\ (x-x_2)^2+(y-y_2)^2+(z-z_2)^2=r_2^2 \\ (x-x_3)^2+(y-y_3)^2+(z-z_3)^2=r_3^2 \end{cases}$$

poistetaan sulut:

$$\begin{cases} x^2-2x_1x+x_1^2+y^2-2y_1y+y_1^2+z^2-2z_1z+z_1^2=r_1^2 & (1) \\ x^2-2x_2x+x_2^2+y^2-2y_2y+y_2^2+z^2-2z_2z+z_2^2=r_2^2 & (2) \\ x^2-2x_3x+x_3^2+y^2-2y_3y+y_3^2+z^2-2z_3z+z_3^2=r_3^2 & (3) \end{cases}$$

Vähennetään $(1)-(2)$ ja $(1)-(3)$:

$$\begin{cases} 2(x_2-x_1)x+(x_1^2-x_2^2)+2(y_2-y_1)y+(y_1^2-y_2^2)+2(z_2-z_1)z+(z_1^2-z_2^2)=r_1^2-r_2^2 & (4) \\ 2(x_3-x_1)x+(x_1^2-x_3^2)+2(y_3-y_1)y+(y_1^2-y_3^2)+2(z_3-z_1)z+(z_1^2-z_3^2)=r_1^2-r_3^2 & (5) \end{cases}$$

ratkaistaan x ja y:

$$\begin{cases} \overbrace{2(x_2-x_1)}^{A}x+\overbrace{2(y_2-y_1)}^{B}y=\overbrace{-2(z_2-z_1)}^{E}z+\overbrace{r_1^2-r_2^2-(x_1^2-x_2^2)-(y_1^2-y_2^2)-(z_1^2-z_2^2)}^{F} \\ \underbrace{2(x_3-x_1)}_{C}x+\underbrace{2(y_3-y_1)}_{D}y=\underbrace{-2(z_3-z_1)}_{G}z+\underbrace{r_1^2-r_3^2-(x_1^2-x_3^2)-(y_1^2-y_3^2)-(z_1^2-z_3^2)}_{H} \end{cases}$$

$$\begin{cases} x=\overbrace{\frac{BG-DE}{BC-AD}}^{I}z+\overbrace{\frac{HB-FD}{BC-AD}}^{J} \\ y=\underbrace{\frac{CE-AG}{BC-AD}}_{K}z+\underbrace{\frac{FC-AH}{BC-AD}}_{L} \end{cases}$$

sijoitetaan (1):een:

$$(Iz+J)^2-2x_1(Iz+J)+x_1^2+(Kz+L)^2-2y_1(Kz+L)+y_1^2+z^2-2z_1z+z_1^2=r_1^2$$

$$I^2z^2+2IJz+J^2-2x_1Iz-2x_1J+x_1^2+K^2z^2+2KLz+L^2-2y_1Kz-2y_1L+y_1^2+z^2-2z_1z+z_1^2=r_1^2$$

$$\underbrace{(I^2+K^2+1)}_{a}z^2+\underbrace{(2IJ-2x_1I+2KL-2y_1K-2z_1)}_{b}z$$
$$+\underbrace{(J^2-2x_1J+x_1^2+L^2-2y_1L+y_1^2+z_1^2-r_1^2)}_{c}=0$$

ja

$$z=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$