$(4x-4y+4z)^2 = 8(3x^2-2xy+3y^2+2xz-6yz+2z^2)$

$16x^2-32xy+16y^2+32xz+ \quad -32yz+16z^2$

$= 24x^2-16xy+24y^2+16xz-48yz+16z^2$

$0 = 8x^2+16xy+8y^2-16xz-16yz$

$x+y$ is a solution to this, so divide through by $x+y$

$$
\begin{array}{r|l}
 & 8x+8y-16z \\
\hline
x+y & 8x^2+16xy+8y^2-16xz-16yz \\
 & 8x^2+8xy \\
 & \quad 8xy+8y^2 \\
 & \quad 8xy+8y^2 \\
 & 0 \quad 0 \quad -16xz-16yz \\
 & \qquad -16xz-16yz \\
 & \qquad 0 \quad 0
\end{array}
$$

Hence $(x+y)(8x+8y-16z)=0$

$(x+y)$ and $(8x+8y-16z)$ are solutions and hence tangents at point $(1,-1,0)$ when each set to zero

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$x+y=0$

~~$8x+8y-16z=0$~~ ✗ $x+y-2z=0$

are the equations of the tangents.

iii) In the standard embedding plane $z=1$, the tangents become

$x+y=0$

$8x+8y=16$ or $x+y=2$ ✓

These are tangents to the conic E, since on examination E is E' in the plane $z=1$, Also, the image of the conic E', the conic E, is an ellipse in the plane $z=1$, since $B^2-4AC = 2^2-4\times3\times3<0$. The tangents to this ellipse given above are parallel lines on either side of the ellipse

and $[1,-1,0]$ is point where they meet.

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