

3.90
3

$A(1,3,3)$ $B(3,4,1)$ $C(-1,3,4)$ $S(0,0,0)$ $H(2,3,2)$ $P(\frac{1}{2}, 2, -\frac{1}{2})$
 $\vec{HP} = (1,3,2) + t(\frac{1}{2}, -1, -\frac{2}{2})$ (6)
 $\frac{x-1}{1} = \frac{y-3}{-2} = \frac{z-2}{-5}$
 $\vec{AC} = (2, -1, -1)$ $\cos \alpha = \frac{|(2, -1, -1) \cdot (\frac{1}{2}, -1, -\frac{2}{2})|}{\sqrt{6} \sqrt{\frac{5}{2}}} = \frac{4.5}{\sqrt{6} \sqrt{5}} = \frac{3\sqrt{5}}{10}$ (7)

(8) $\vec{n} = \vec{AB} \times \vec{AC} = \begin{vmatrix} i & j & k \\ 2 & 2 & -4 \\ -2 & 1 & 1 \end{vmatrix} = 6i + 6j + 6k \rightarrow (1, 1, 1)$
 $\frac{x}{1} = \frac{y}{1} = \frac{z}{1} : k's (0,0,0) \rightarrow (1,1,1)$ \vec{n} is normal to the plane

(9) $t(1,1,1)$ is the line passing through the origin. The plane equation is $x+y+z-6=0$. The distance $d = \frac{6}{\sqrt{3}}$.

$d = \delta$ when the line is tangent to the plane. $\frac{6}{\sqrt{3}} = \frac{|3t-6|}{\sqrt{3}} \rightarrow 6 = |3t-6| \rightarrow t=0 \rightarrow (0,0,0)$
 $\rightarrow t=4 \rightarrow (4,4,4)$