First Name:_____ Last Name: _____ Student ID: _____

Relationships between Points, Lines and Planes (2)

1. For the following, find the distance between the given point *P* and the line ℓ.

a. *P* (1,2); ℓ: 3*x*+*y*−12=0
b. *P* (−3,1,0); ℓ: (x, y, z)= (7, -2, -3)+ t(3, 2,-1)

2. Find the distance between each of the following pairs of parallel lines.

a. ℓ1: $\vec{r}$= (5,2,3)+*s*(3,1,−1) and ℓ2: $\vec{r}$= (−4,2,4)+*t*(3,1,−1)
b. ℓ1: $\vec{r}$= (0,2,3)+*s*(3,3,1) and ℓ2: $\vec{r}$= (4,−1,1)+*t*(3,3,1)

3. a. Find the point on the line ℓ: $\begin{cases} x = 2 + 3s \\ y = 1 - s \\ z = -4 + s \end{cases}$ that is closest to the point (5,−2,8).

b. Determine the distance between (5,−2,8) and ℓ.

4. The point A (−5,2,4) is reflected in the line with equation $\frac{x}{4} = \frac{y}{2} = z-1$. Find the coordinates of its image, A'.

5. Find the distance between the following pairs of skew lines.

ℓ1: (x,y,z)= (4,1,0)+s(1,3,2) and ℓ2 : (x, y, z)= (−5,3,3)+t(−1,1,2)

6. Find the distance between the line and the plane:

$x-4=y-5=z+1$ and $x-3y+2z-24=0$

7. Find the point on the plane $x-2y+z-8=0$ that is closest to (10,12,4) (Hint: it is on a line that passes through the given point, perpendicular to the plane.)

8. Find the distance between the two planes:

$x-2y+3z+6=0$ and $x-2y+3z-24=0$