$$5.\ r: \frac{x-1}{2} = \frac{y}{3} = z+1 \qquad M(1,1,1) \qquad N=?$$

$$r: (1,0,-1) + (2,3,1)t \qquad \vec{v} = (2,3,1)$$

$$\overrightarrow{M'M} = (1,1,1) - (x,y,z) = (1-x, 1-y, 1-z)$$

$$\langle (1-x, 1-y, 1-z) \cdot (2,3,1) \rangle = 0 \quad \Rightarrow \quad \langle \overrightarrow{M'M}, \vec{v} \rangle$$
$$2 - 2x + 3 - 3y + 1 - z = 0$$
$$z = -2x - 3y + 6$$

$$\overrightarrow{M'M} = (1-x, 1-y, 2x+3y-5)$$
$$M' = (x, y, 6-2x-3y)$$

M' tem que pertencer a reta, então:
$$(x, y, 6-2x-3y) = (1, t, -1)$$

$$x = 1 \qquad y = t \qquad \begin{array}{l} 6 - 2x - 3y = -1 \\ -2x - 3y = -7 \end{array}$$

tilibra

$-2.1 - 3.\hat{z} = -7$

$-3\hat{z} = -5$

$\hat{z} = \dfrac{5}{3}$

$z = \dfrac{6 - 2.1 - 3.5}{3}$

$z = 4 - 5$

$z = -1$

$M' = \left(1, \dfrac{5}{3}, -1\right)$

M' é o ponto médio de M e N

$M' = \dfrac{M + N}{2}$

$N = 2M' - M$

$N = 2.\left(1, \dfrac{5}{3}, -1\right) - (1, 1, 1)$

$N = \left(2, \dfrac{10}{3}, -2\right) - (1, 1, 1)$

$N = \left(1, \dfrac{9}{3}, -3\right)$

$N = (1, 3, -3)$