Please PRINT your name _____

No calculators, cell phones, computers, notes, etc.

Circle your answer. Make your work correct, complete and coherent.

The quiz is worth 5 points. The solutions will be posted on my website later today.

Quiz 7, February 10, 2020

Find the point on the plane $5x + 3y - 7z = 73$ which is closest to the point $(1,2,3)$.

The line which passes through $(1,2,3)$ and is perpendicular to the plane is

$$x - 1 = 5t, \quad y - 2 = 3t, \quad z - 3 = -7t.$$

This line hits the plane when

$$5(5t + 1) + 3(3t + 2) - 7(-7t + 3) = 73$$

$$(25 + 9 + 49)t + 5 + 6 - 21 = 73$$

$$83t = 83.$$

The line and the plane intersect when $t = 1$. The point of intersection is $(6, 5, -4)$.

The point on $5x + 3y - 7z = 73$ closest to $(1,2,3)$ is $(6, 5, -4)$

Check. The point $(6, 5, -4)$ is on the plane because $5(6) + 3(5) - 7(-4) = 73$. Furthermore, the vector which connects $(1,2,3)$ to $(6,5,-4)$ is $5\overrightarrow{i} + 3\overrightarrow{j} - 7\overrightarrow{k}$, which is perpendicular to the plane $5x + 3y - 7z = 73$.