Homework on lines in R3:

1. Convert each of the following equations to the requested form.

   a) $\dfrac{x+8}{5} = \dfrac{y+9}{-2} = \dfrac{2-z}{-1}$ to vector form. $\qquad\qquad (x,y,z)=(-8,-9,2)+t(5,-2,1)$

   b) $\begin{cases} x = -3 + 4t \\ y = -t \\ z = 2 - 2t \end{cases}$ to vector form. $\qquad\qquad \{\,(x,y,z)=(-3,0,2)+t(4,-1,-2)\,\}$

   c) $(x,y,z)=(-1,4,5)+k(2,-2,2)$ to parametric form. $\qquad\qquad \begin{cases} x = -1 + 2k \\ y = 4 - 2k \\ z = 5 + 2k \end{cases}$

2. Give the coordinates of three points on the line $(x,y,z)=(1,1,2)+k(3,-1,-1)$ $\qquad$ {many answers}

3. Find the symmetric equation of the line through the origin parallel to the line through A(4,3,1) and B(-2,-4,3). $\qquad \{\dfrac{x}{6} = \dfrac{y}{7} = \dfrac{z}{-2}\}$

4. For each of the following pairs of lines, determine whether they are identical, parallel or neither.

   a) $\vec{r}_1 = (1,0,3)+t(3,-6,3)$ and $\vec{r}_2 = (2,-2,5)+m(2,-4,2)$ $\qquad$ {parallel}

   b) $\vec{r}_1 = (2,-1,4)+t(3,0,6)$ and $\vec{r}_2 = (-3,0,1)+m(2,0,2)$ $\qquad$ {neither}

   c) $\vec{r}_1 = (1,-1,1)+t(6,2,0)$ and $\vec{r}_2 = (-5,-3,1)+m(-9,-3,0)$ $\qquad$ {identical}

5. Which of the following points lies on the line $x = 2t,\ y = 3+t,\ z = 1+t$?

   P(2,4,2) $\qquad$ Q(-2,2,1) $\qquad$ R(4,5,2) $\qquad$ S(6,6,2) $\qquad\qquad$ {P}

6. Find a vector equation of the line through A(2,0,-3) and B(-3,2,-2) $\qquad \{\,(x,y,z)=(2,0,-3)+k(5,-2,-1)\,\}$