Question Set 3

CS 320

Chapter 3

1. What does $\tilde{o}$ represent?

2. Practically speaking, what is the difference between a basis and a frame?

3. Given points $\tilde{p}$ and $\tilde{q}$, how do we construct a vector from $\tilde{p}$ to $\tilde{q}$?

4. Is translation linear or affine?

5. Is rotation linear or affine?

6. Does $(3, 7, 8, 1)$ represent a point or a vector?

7. Express the affine matrix
$$\begin{bmatrix} a & b & c & d \\ e & f & g & h \\ i & j & k & l \\ 0 & 0 & 0 & 1 \end{bmatrix}$$
as the product of its translational and linear factors.

8. Define RBT.

9. These two operations make sense: $\tilde{p} - \tilde{q} = \vec{v}$ (point-point subtraction), and $\tilde{q} + \vec{v} = \tilde{p}$ (point-vector addition). On its face, this operation does not make sense (What is the product of a scalar and a point? What is the sum of two such objects?):

$$\alpha \tilde{p}_1 + (1 - \alpha)\tilde{p}_2,$$

in which α is on the interval $[0, 1]$. Algebraically manipulate this operation into a form that does make sense. What is the type (vector or point) of this operation? What is its geometric interpretation?