4.1

If the scaling matrix is uniform then RS = RS(α, α, α) = αR = SR  
  
Consider Rx(θ), if we multiply and use the standard trigonometric identities for the sine and cosine of the sum of two angles: Rx(θ)Rx(φ) = Rx(θ + φ)  
  
Multiplying the matrices: T(x1, y1, z1)T(x2, y2, z2) = T(x1 + x2, y1 + y2, z1 + z2)

4.7 Multiplying the matrices that the concatenation of two rotations yields a rotation and that the concatenation of two translations yields a translation. If we look at the product of a rotation and a translation, we find that the left three columns of RT are the left three columns of R and the right column of RT is the right column of the translation matrix. If we now consider RTR′ where R′ is a rotation matrix, the left three columns are the same as the left three columns of RR′ and the and right column still has 1 as its bottom 1 element. The form is the same as RT with an altered rotation and an altered translation.

4.8 A transformation can be interpreted as a rotation followed by an unequal scale reduced by another rotation. In a singular value destruction, A = USVT, where are you and V is a linear logarithmic matrix and S is a diagonal scale matrix.  
The cut in the y direction is a factor in the \* scaling \* rotation.

4.12 A plane can be described by the equation ax + by + cz + d = 0. Two homogeneous coordinate column matrices p = [x, y, z,1]T and n = [a,b,c,d]T then the equation of the plane becomes p.n = 0. T is transposed.

4.13 it has x,y,z coordinates.

4.21 The vector Vec1 = u × v is orthogonal to u and v. The vector Vec2 = u × Vec1 is orthogonal to u and Vec1.

Hence, u, Vec1 and Vec2 form an orthogonal coordinate system.