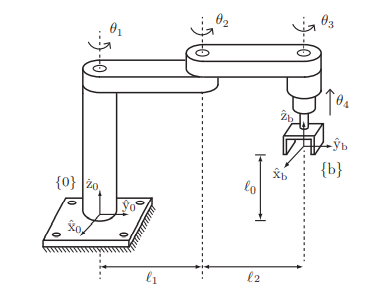
**Assignment 1 Makeup Assignment – Due December 15th (No late submissions)**

Complete the problems below to earn up to 50% of points lost on assignment 1 back

If completing the problems on paper, turn in the worked problems

If completing the problems in Matlab, turn in your code

1. Find the inverse of the below rotation matrices:
2. Find the inverse of the below transformation matrices:
3. Write a transformation matrix that translates a point 2 units in the x direction, 1 unit in the y direction, and 0 units in the z direction
4. Write the skew-symmetric form of the following vectors (i.e. w → [w])
5. Let Tsb = T2. For pb = , find pa
6. For gravity vector (in the world frame), what would the gravity vector in the body frame?
7. For the below robot, let l1 = l2 = l3 = 1:  
   
   1. Write M
   2. Write the body-frame screws for each of the four joints
   3. Calculate the matrix exponentials for joints 1 to 4
   4. For θ = [pi/4, -pi/4, pi/2, 0.5], First see if you can reason about what you would expect the Tsb matrix to be.
   5. Using the product of exponentials formula, Calculate Tsb
8. How do Screws such at the ones we calculated in 7.b. differ from the Jacobian of the same joint? In other words, what does the Jacobian account for that the screws do not?
9. The book gives the below inverse kinematics algorithm. In your own words, qualitatively, how does this algorithm function?  
   