CSG140 Computer Graphics. Spring 2004. Quiz #1

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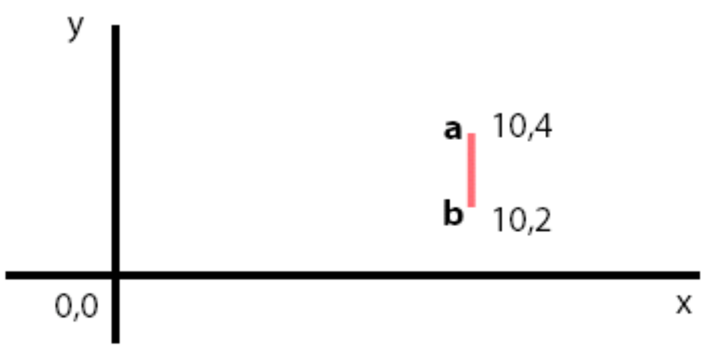
This quiz is for Thursday 22 January - Closed book/notes

Question 1. For the figure below, transform the endpoints **a** and **b** of the line segment to transform the line segment. Each transform should be a 3x3 matrix (homogeneous coordinates). The transforms you are to construct and apply are first: Construct a translation matrix that moves the center of the line segment to the origin and then apply it to **a** and **b**. Second, rotate each resulting point around the origin by -90° (minus 90 degrees). Third, transform those resulting endpoints using the inverse of the original translation. Draw the final state of the line segment, indicating each transformed endpoint, **a'** and **b'**. Explain intuitively why you expect it to appear as you computed.



Question 2. Write out the 2x2 rotation matrix **R**(φ), for the general angle φ, and another, **R**(-φ), for minus φ. Form the product of **R**(φ) and **R**(-φ) and show that it is the identity matrix.

Question 3. Two planes have [x,y] normal vectors $\mathbf{n}_1$ = [1,0] and $\mathbf{n}_2$ = [1,1] (no z component). Compute the dot product of the two using Cartesian coordinates and show that the result is equal to the result obtained by using the formulation:

$\mathbf{n}_1 \cdot \mathbf{n}_2 = ||\mathbf{n}_1||\ ||\mathbf{n}_2|| \cos\varphi$.