

CMCS427 Midterm prep and sample questions

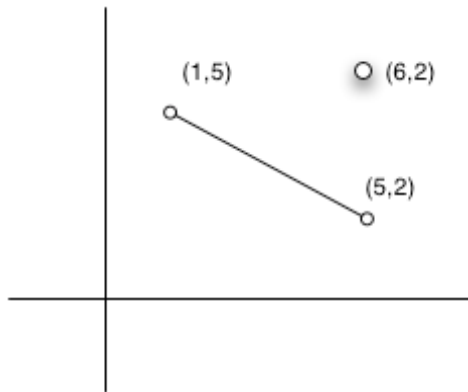
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1. Given the two vectors $\langle 3, 2, 1 \rangle$ and $\langle 3, -1, 4 \rangle$, is the angle between them equal to, greater than or less than 90 degrees? What is the fastest way to answer this?

2. Considering the two vectors in the previous question, exactly how would you compute the angle θ between them? Set up the formula but don't compute any inverse trig functions.

3. Give matrices to rotate, scale and translate a shape around its center of mass. Assume the center of mass is at (x, y, z) , the scale is uniform and value s , and the rotation is around the Z axis with angle t . Give the matrices, and then give the composition of matrices you'd need to perform the operations in the right order. Do not calculate out the final matrix. Given that matrix multiplications can be non-commutative, are there more than one composition that would work?

4. Given the two points $(1,5)$ and $(5,2)$, in the diagram below, give the following:

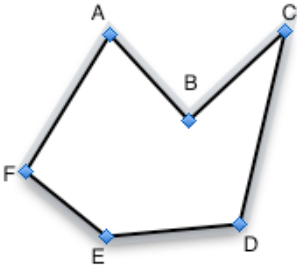


a) A parametric equation for the perpendicular bisector line.

b) The point-normal form of the same line.

e. What is the distance from $(6,-5)$ to the line?

5. Give the sequence of vertices needed to draw this polygon using GL_TRIANGLE_STRIP.



6. Give a fragment of Processing needed to draw a parametric ellipse, given the appropriate variables t, A and B. We have the equations $x = A \cos(t)$, $y = B \sin(t)$.

7. Determine whether or not the parametric curve in the previous question satisfies the implicit equation

$$\frac{x^2}{A} + \frac{y^2}{B} = 1$$