# Lecture 3: Math for Computer Graphics – Review Questions

- What is the difference between a point and a vector?
- What are homogeneous coordinates? How do we represent points and vectors using homogeneous coordinates?
- What is the 'right hand rule' for coordinate frames?
- How do you compute:
    - the dot product of two vectors
    - the cross product of two vectors
    - the angle between two vectors
- When would you use the C function atan2?
- What is an orthonormal basis?
- How do we compute an orthonormal basis from a single vector?
- If we have a vector stored in a basis frame u,v,w, how do we convert it to a vector stored in world frame x,y,z?
- What are the implicit and parametric forms of a line? Why are they named implicit and parametric?
- What is the implicit form of a circle centered at $(x_c, y_c)$ with radius r?
- What are implicit and parametric expressions for surfaces?
- Write:
    - an implicit equation for a line given two points
    - a parametric equation for a line given two points
    - an implicit equation for a plane given three points
- What are barycentric coordinates?
- How would we interpolate vertex colors using barycentric coordinates?
- Given an point and a triangle, how do we find the barycentric coordinates of that point?

Looking ahead:

- Write a parametric expression for a line (a ray) and an implicit expression for a sphere and determine where (if at all) the two intersect.