



## CS 450/550 -- Fall Quarter 2020 Test #1 Review

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*This page was last updated: September 10, 2020*

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Test #1 will be taken using the Canvas Quiz mechanism.  
It will consist of ~40 multiple choice questions to be done in 60 minutes.  
It will be **Open Notes**.

**Warning!** "Open Notes" is not the same as "I don't need to study for it"! You will run out of time if you have to look up in the notes every one of the questions.

### **Test date and time range:**

The test will open on Friday, October 30, at 12:01 AM PST.  
It will close Sunday, November 1, at 11:59 PM.  
(Same time range as the quizzes have been.)  
Once you start, you have 60 minutes to finish or until Sunday 11:59 PM, whichever comes first.

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### **Test rules:**

- The test is worth 100 points.
- It is closed friends.
- You are responsible for
  1. what is in all handouts
  2. what was said in class
  3. what was on the quizzes
  4. what you have done in the projects.

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### **The test can potentially cover any of the following topics:**

- The Graphics Process: Geometric models, Animation, Lighting, Surface information, Texture information, Rendering
- Project Notes:  
Project turn-in procedures  
Bonus Days

- The Graphics Pipeline: Model-to-World transform, View transform, Per-vertex lighting, Projection transform, Viewport transform, Rasterization
- Coordinates: Model, World/Eye, Screen
- 3D Coordinate Systems: Left-handed. Right-handed. Right-handed positive rotation direction.
- OpenGL:
  - Drawing: glBegin-glEnd, topologies, viewports
  - Polygons: planar, convex, CW/CCW
  - Transformations: glMatrixMode, glLoadIdentity, glRotatef, glTranslatef, glScalef, compound transformations, transformation order, matrix stack, glPushMatrix, glPopMatrix
  - Projections: orthographic projection, perspective projection, advantages of each.
  - Color: additive color (RGB) subtractive color (CMYK), HSV
  - Vertices-to-Fragments: the rasterizer, smooth shading
- GLUT: opening a window, callback functions, the idle function
- Display Lists: what they are, what is the advantage of using them
- Viewing: gluLookAt, eye position, look-at position, up-vector
- The framebuffer: number of bits/pixel, {z-, zed-, depth-}buffer, double buffering, front and back buffers, z-fighting
- 2D Textures: general idea, (s,t) coordinates, texture wrapping, texture filtering, texture environments, glTexCoord2f, texture transformations, texture objects, texture binding, procedural textures.
  - Potential problems where s or t instantly jump from 1. to 0. (e.g., the back of the sphere)
- OpenGL Transparency:
  - It's really blending
  - glColor4f( )
  - glBlendFunc( )
  - (You don't need to be able to replicate the code.)
- Lighting:
  - Components: Ambient, Diffuse, Specular.
  - Shading: Flat vs. Smooth, Per-vertex vs. Per-fragment lighting
  - Types of lights: point, directional, spot
  - Specifying lights: colored lights, light position, homogeneous coordinates, modelview matrix, light direction, spotlight cutoff angle and concentration

- GLSL Shaders:  
The two most common types of GLSL Shaders: vertex shaders, fragment shaders  
Interface Variables: per-vertex attribute variables, uniform variables, out/in variables  
Data types (e.g., vec3, vec4, mat4)  
Key built-in variables: gl\_ModelViewMatrix, gl\_ProjectionMatrix,  
gl\_ModelViewProjectionMatrix, gl\_Vertex, gl\_Normal, gl\_Color, gl\_Position,  
gl\_FragColor  
The role of the rasterizer,  
Discard operator (fragment shader only)
- GLM:  
What is it? Why do we care about it?  
You don't need to know specific calls
- Projects:

1	Draw something cool in 3D
2	Helicopter animation
3	Texture mapping and distortion