I wouldn’t expect you to have various precise formulas memorized, (e.g. the form of a rotation matrix), thus you can use one page of notes.

A list of topics we covered is below.

**Midterm 1**

**Displays**
- CRTs
- LCDs
- Raster scan vs. vector scan
- Gamma, gamma correction

**Line drawing, rasterization**
- Line equation
- DDA
- Bresenham’s Line Algorithm
- Convex vs concave polygons
- Testing convexity

**2D Transformations**
- Vector representation of a point
- Matrix translation, rotation, scaling
- Homogeneous coordinates
- Composing a string of transformations
- Concept of changing coordinate systems

**3D Transformation**
- 3D rotation around a line as $R_x R_y R_z$
- Matrix translation, rotation, scaling
- Matrix stacks
- Object coordinates vs world coordinates
- Modelview matrix
- Camera transform duality with object transform
- Hierarchical transforms

**Viewing and Perspective**
- Orthographic vs perspective
- World coordinates vs screen coordinates
- View frustum
- Near and far clipping planes
- Oblique parallel projection
- Concept of oblique perspective projection
- Viewing pipeline object -> world -> normalized -> screen

**Visibility**
- Back face detection
- Z-buffer (Depth-buffer)
- A-buffer (list of depths)
- A-buffer (openGL accumulation buffer)
- BSP trees
- Screen space sort vs object space sort

**Midterm 2**

**Color models**
- Electromagnetic spectrum
- Spectral colors
- Color matching functions
- CIE chromaticity diagram
- RGB space
- HSV space

**Raytracing**
- Basic algorithm
- Shadow rays
- Reflected/refracted rays
- Anti-aliasing by supersampling
- Distributed ray tracing for estimating integrals

**Lighting, shading**
- OpenGL ambient+diffuse+specular lighting model
- Phong specular reflection vs. Phong shading
- Gouraud vs Phong shading

**Sampling theory**
- Point sampling
- Area weighted sampling
- Convolution
- Duality of spatial and Fourier domain
- Concept of low/high frequencies
- Aliasing caused by signal with too high a frequency
- Solution to aliasing (band limit single or sample at higher frequency)

**Aliasing, anti-aliasing**
- Nyquist frequency
- Super-sampling sub-pixels

**Image warping, textures**
- Concept of UV coordinates
- Texture space – object space – screen space
- Bump mapping
- Correct texture filtering, problems with point sampling
Final (all of the above + below)

**NPR**

*Haebel’s paint by numbers system*

**Curves, surfaces**

- Parametric vs implicit surface representation
- Interpolation vs approximation in splines
- $C^1$ vs $G^1$ continuity
- Constructive Solid Geometry

**Animation**

- Concept of key-framing
- Squash and stretch

**IBR, volume rendering**

- Two plane parameterization of rays
- Concept of 4D lightfield
- Concept of volume data

**Compositing**

- Alpha as partial pixel cover
- Pre-multiplied alpha

**Notable things that were in class that you should know about that weren’t above**

- BRDFs
- Mipmaps
- Summed-area-tables
- Oct-trees