Homework 4 - Readings Ch7 & Ch8

1. What are the three items of information required to specify the viewing direction? Describe each one of them.

   The Viewing Direction is made up of the eye point, look-at point, and the up direction. Respectively the eye point is the starting point from which the 3d space is views . The Look-at point as the name suggest is the point where the camera is position as the the vector from the Eye-point to the Look-at point creates a vector that replicates the line of sight. The up direction determines teh rotation of the camera.

2. Define a view matrix and describe the method that can be used (according to the book) to calculate it in Javascript?

   The View Matrix is the matrix is used to change the view of a scene. The method in setLookAt() is used in this case to manipulate the view of the scene and takes the parameters of the eye point, Look-at point, and up direction of the scene.

3. What is the difference between orthographic projection and perspective projection? What methods can be used to calculate the orthographic projection? And the perspective projection? Explain the arguments of both the methods.

   Orthographic Projection doesn't consider depth of scene while Perspective Projection uses depth to create illusion of 3d space. To calculate orthographic projection we use the method setOrtho() which takes the parameter of left, right to determine the distance between the left side and right side of the near clipping plane. The bottom and top to specify the distance to the bottom and the top of the near clipping planes, and near and far to specify the distance to the near and far clipping planes. The setPerspective() method is used to calculate the perspective projection and has the parameters of fov(angle of the top and bottom planes), aspect(specifies the aspect ration of the near plan width/ height), near, and far(both near and far determine the clipping planes along the line of sight).

4. Describe the three major types of light sources: directional, point and ambient.

   Direction Light: A directional light represents a light source whose light rays are parallel, nad may come from an infinite distance. Like the sun.

   Point Light: Emits multiple rays of light in different directions from one source of light.

   Ambient Light: Model of Light is emitted from the other light source, reflected from other objects in the way.

5. Explain ambient reflection. Provide the equation that models this reflection and draw a figure illustrating it.
   The reflection of light from another light source.

   Equation:
   〈Surface color by diffuse and ambient reflection 〉 =
   〈 Surface Color by Diffuse reflection〉 + 〈 Surface Color by Ambient refelection〉

6. Explain diffuse reflection. Provide the equation that models this reflection and draw a figure illustrating it.
   Diffuse Reflection is the reflection of light from a directional light or point light

   Equation:
   〈 Surface color by diffuse reflection〉 =
   〈light color 〉 * 〈 base color of surface〉 * cos(Θ)

7. What is a surface normal? How many normals are there in a surface? Draw a cube and the normals of all of its vertices.
   A surface normal is a vector which is perpendicular to the the surface of a given point. A surface is given two normals as it has a back and front face.