Texture mapping review

Qualitative questions

1. Why use textures?

   Answer:
   Create effects that are much more complex and realistic without adding orders of magnitude to the geometry (number of polygons)

2. Describe the steps for applying a 2D texture to a surface.

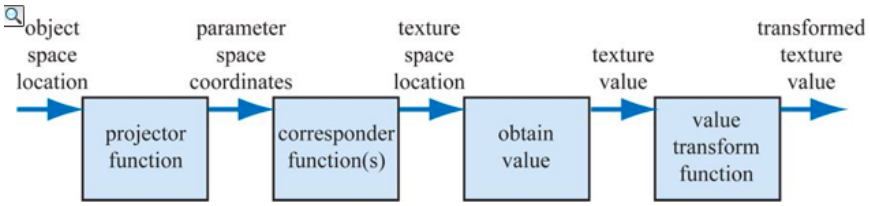
   Answer:

   (a) Project the object space coordinates into parameter space (u, v)

   (b) Use the (u, v) parameter coordinates and some corresponder function to get a texture space location

   (c) Get a texture value from that location
   (optional: transform the texture value)

   (d) Apply that value to the corresponding location on the surface.



Projector functions

3. Describe the steps for applying a 2D texture to a 3D object using an intermediate object.

   Answer:

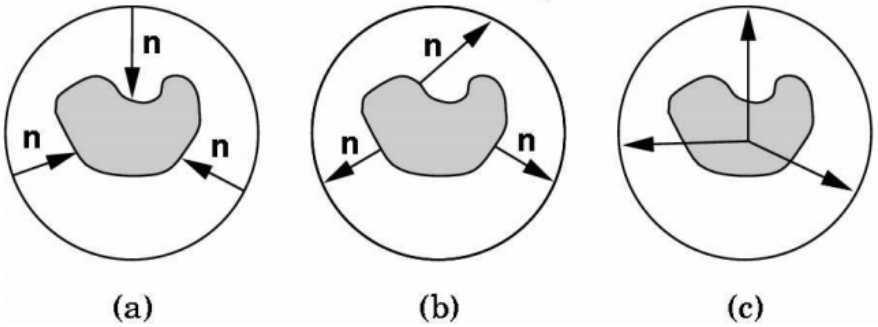
   (a) Map the texture to a 3D intermediate object for which a mapping is defined, such as a cube, cylinder, or sphere

   (b) Map the intermediate object to the target object by

      i. following the normal from each point on the intermediate object to a point on the surface

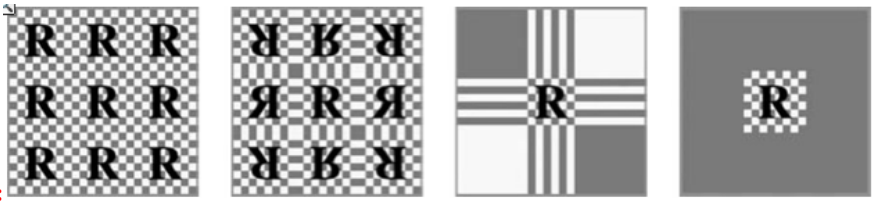
      ii. following the normal from each point on the surface to a point on the intermediate object

      iii. following a ray from the center of the target object through a point on the surface to a point on the intermediate object



Corresponder functions

4. What are various ways of applying an image to a surface (handling texture coordinates outside of (0, 1))?

Answer: 

- **repeat, tile**: image repeats itself across the surface (drop the integer part of the parameter value)
- **mirror**: image repeats itself across the surface and is mirrored (flipped) on every other repetition. Provides some continuity along the edges of the texture
- **clamp**: values outside the range [0, 1) are clamped to this range.
- **border**: parameter values outside [0, 1) are assigned a separately defined border color. Good for rendering decals onto surfaces