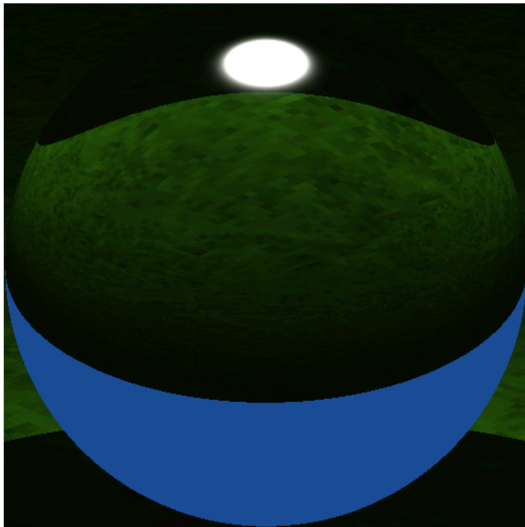


**Question:** Render the default scene using different pixel subdivision levels. Compare result from nearest and linear texture sampler filtering and explain how scaling the texture coordinates affects the rendered texture. Divide the texture scaling factor by 10 to magnify the texture by a factor 10. Describe how texture aliasing is affected by pixel subdivision level and nearest versus linear filtering, respectively.

Rendering both images using the nearest filter with a texture scaling factor of 0.1 and pixel subdivision of 1 produces the anticipated pixelated appearance on the plane. However, since there's no subdivision, the texture pixel edges appear jagged. By increasing the pixel subdivision count, the pixelated look is retained (which is useful for pixel art), while also smoothing the edges of each perceived texture pixel.

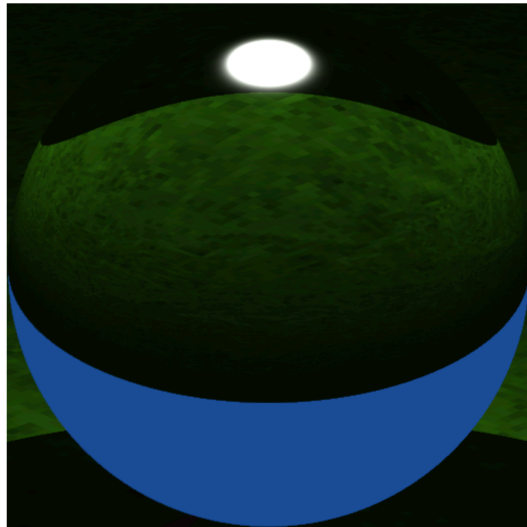
Using the nearest filter results in noisy images when the camera distance is changed because sampling a single texel causes pixel colors to change non-linearly. This issue can be resolved by increasing the pixel subdivision.

Glass sphere shader: Glossy Plane/triangle shader: Lambertian  
clamp-to-edge nearest repeat linear Use Texture: ☒ Pixel Subdivision: 1



Nearest filter subdivision 1

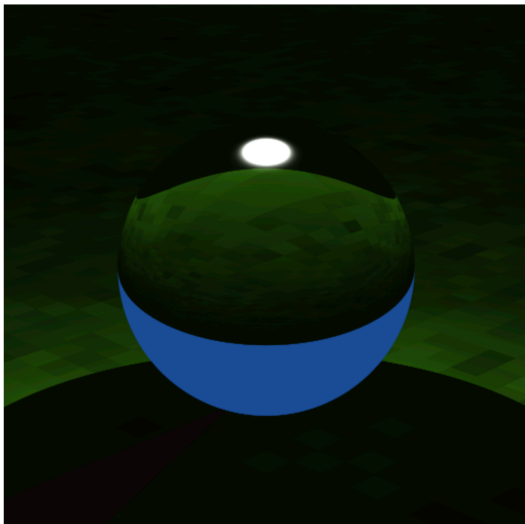
Glass sphere shader: Glossy Plane/triangle shader: Lambertian  
clamp-to-edge nearest repeat linear Use Texture: ☒ Pixel Subdivision: 10



Nearest filter subdivision 10

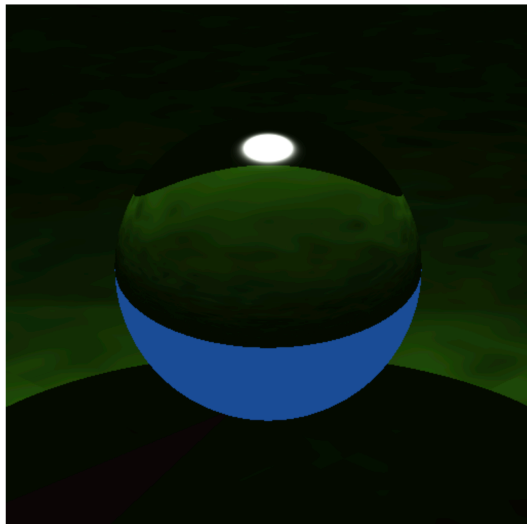
Further reducing the texture scaling factor to (0.2/10) highlights the fact that using the nearest filter preserves the pixelated appearance of the texture, while the linear filter makes the entire texture appear blurry due to blending colors of texels from the texture's end and beginning. In this case, increasing the pixel subdivision to a higher number yields no visible changes to the rendered texture, regardless of whether we use the nearest or linear filter. This is because the texels are simply too large for the subdivision to have any effect.

Glass sphere shader: Glossy Plane/triangle shader: Lambertian  
clamp-to-edge nearest repeat linear Use Texture: ☒ Pixel Subdivision: 5



Nearest filter, small texture scaling factor

Glass sphere shader: Glossy Plane/triangle shader: Lambertian  
clamp-to-edge nearest repeat linear Use Texture: ☒ Pixel Subdivision: 1



Linear filter, small texture scaling factor