Procedural Textures

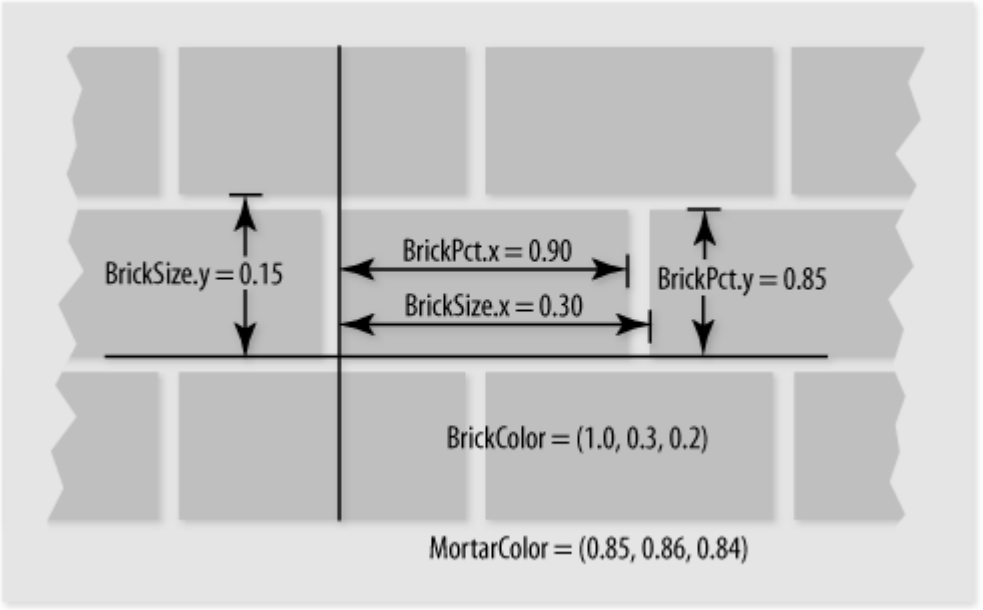
CSCI 4239/5239
Advanced Computer Graphics
Spring 2026

What is a procedural texture?

- A procedural texture is a shader program that generates the texture using a series of calculations
  - You can access textures from a shader, but this is calculates pixel colors on the fly
- Examples:
  - Brick shader
  - Mandelbrot shader
  - The much cooler shader you will write for homework 2

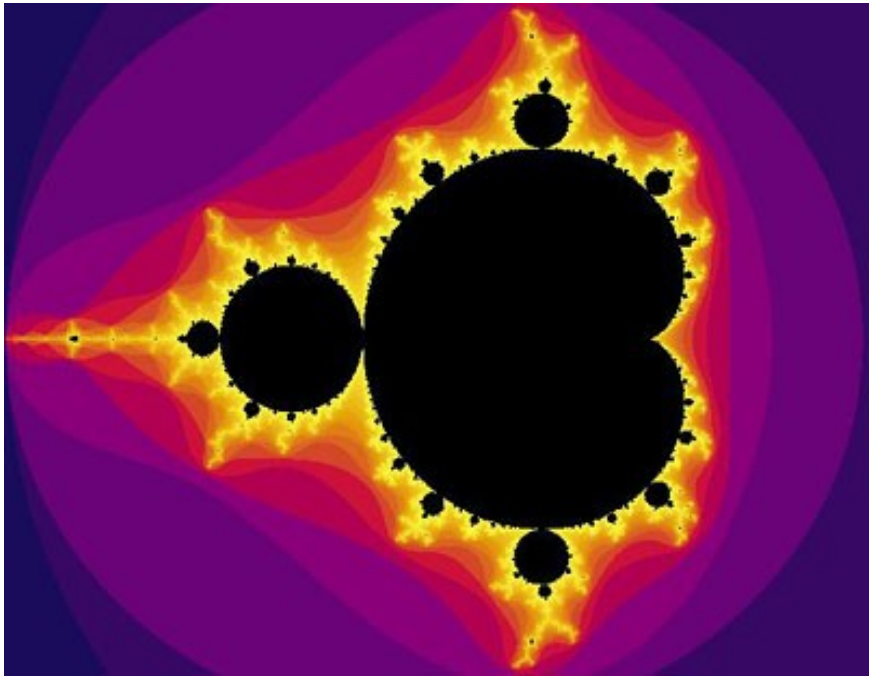
Brick Shader (Orange Book Ch 6)

- Uses scalar Phong shading for lighting
- Calculates brick/mortar based on model coordinates



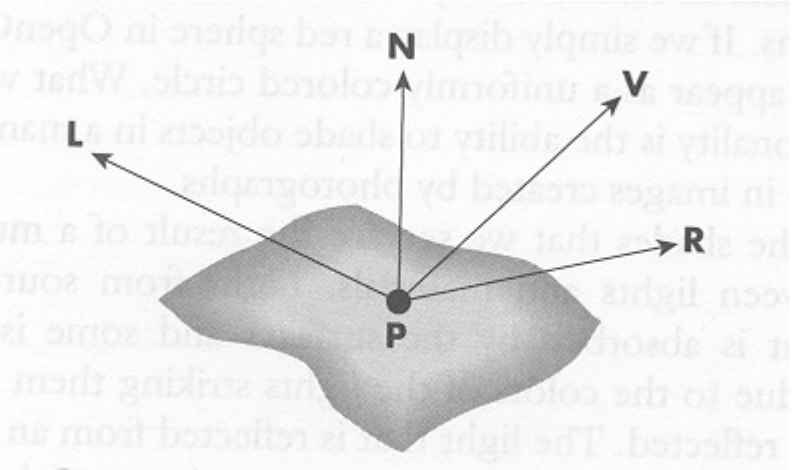
Mandelbrot Shader

- Complex Quadratic Polynomial Sequence
  - $z_{n+1} = z_n^2 + c$
- For which values of c is the sequence bounded
- This is a fractal set
  - Finite area
  - Boundary is infinite
  - Self-similar



Phong Lighting

- *L* light source
- *N* normal vector for surface
- *R* reflected light
  - $R = 2(L \bullet N)N - L$
- *V* viewer (eye)
- Intensity $(V \bullet R)^S MC$
  - *S* shininess
  - *M* material reflection coefficient
  - *C* color if light source
- Calculated independently for R,G,B



Assignment 2

- Build your own procedural texture
  - Text Chapter 8
  - Google
  - IMPROVE WHAT YOU FIND
    - Justify every instruction
- Watch out for noise functions
  - GLSL functions usually not implemented
    - Always returns 0
  - We will cover noise textures later on