

Computer Graphics: Assignment 02

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1 Preprocessor

With the definition `#define SQUARE(a) a*a` `g` and `h` return wrong results, because the macro only does the textual replacement and thus you end up with:

$$g(1) = 1 - 1 * 1 - 1 = -1$$

$$g(2) = 1 - 2 * 1 - 2 = -3$$

...

$$h(1) = 1./1 * 1 = 1$$

$$h(2) = 1./2 * 2 = 1$$

...

2 Output Devices

Generating the whole array may take $T = \frac{1}{50Hz} = 0.02 \text{ s}$. Generating one pixel may thus take $T_p = \frac{1}{1000 \cdot 1000 \cdot 50Hz} = 2 \times 10^{-8} \text{ s}$.

3 Lighting Models

- ambient: The general brightness of the scene, intensity value will be added to each pixel
- diffuse: Light reflection such that an incident ray is reflected at many angles following the lambertian emission law. The surface will have the same radiance from all angles.
- specular: Light reflection such that the angle of incidence roughly equals the angle of reflection
- The exponent describes the decay of reflectivity when differing from the main reflection direction $R = 2N(NL) - L$. A high exponent leads to a mirror-like reflection while a low exponent leads to a rough looking surface.
- To get an intensity gradient, one interpolates between the face normals. To preserve sharp edges, multiple face normals are stored per vertex.