Noise-Based Textures: Linear Interpolation
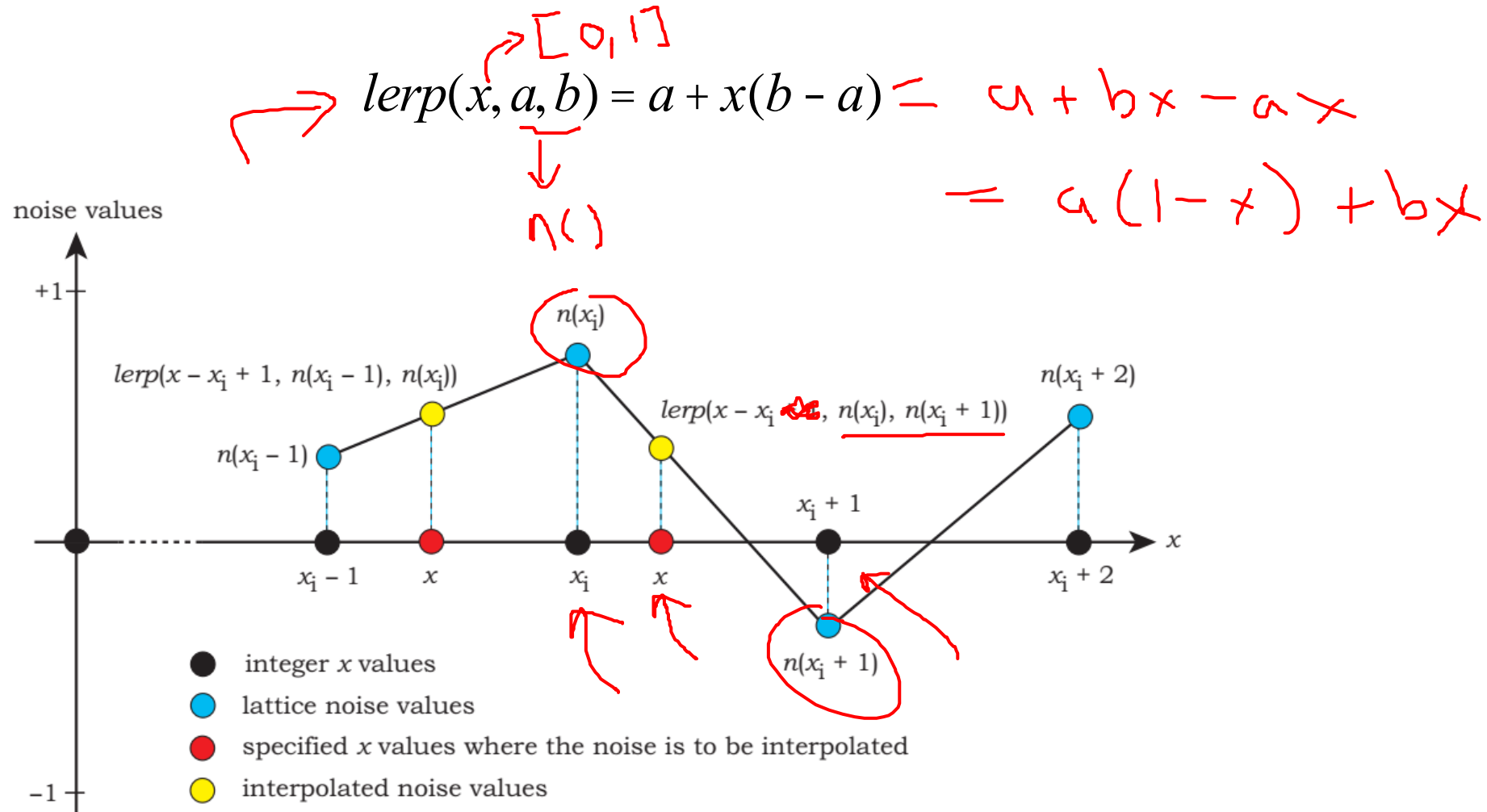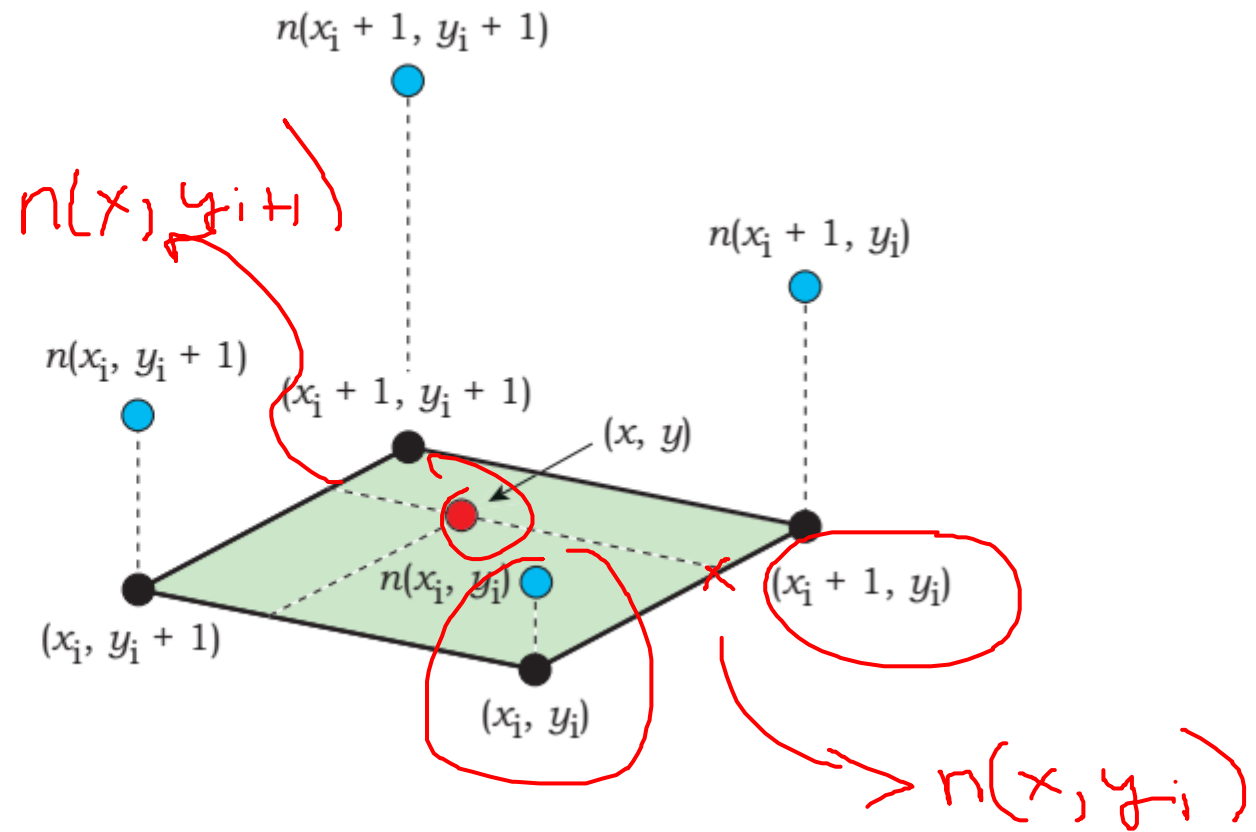
Production Computer Graphics

Eric Shaffer

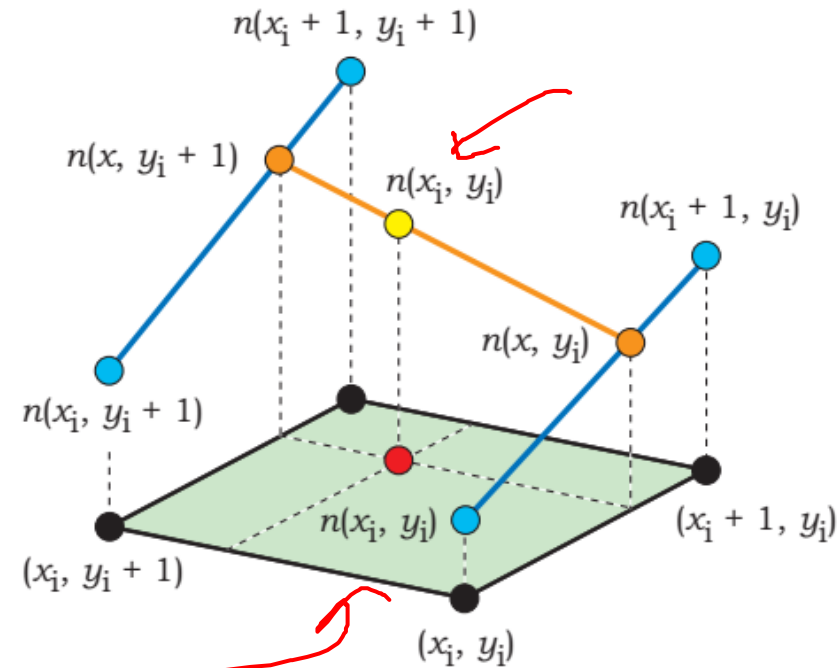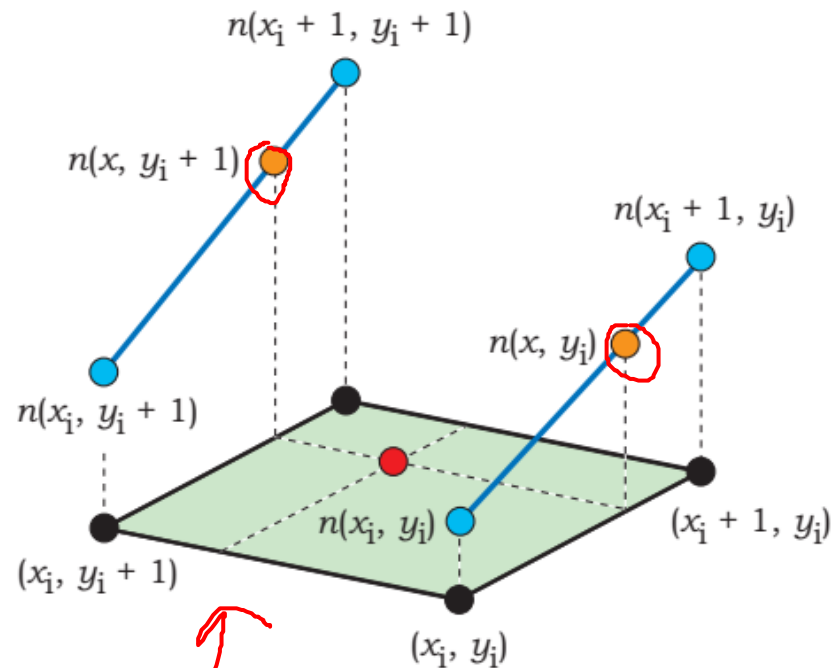# Linear Interpolation

$$lerp(x, a, b) = a + x(b - a) = a + bx - ax$$

$$\to [0, 1]$$

$$n()$$

$$= a(1 - x) + bx$$

noise values

$+1$

$n(x_i)$

$lerp(x - x_i + 1, n(x_i - 1), n(x_i))$

$n(x_i + 2)$

$lerp(x - x_i, n(x_i), n(x_i + 1))$

$n(x_i - 1)$

$x_i + 1$

$x_i - 1$ x x_i x $x_i + 2$

$n(x_i + 1)$

● integer x values

● lattice noise values

● specified x values where the noise is to be interpolated

● interpolated noise values
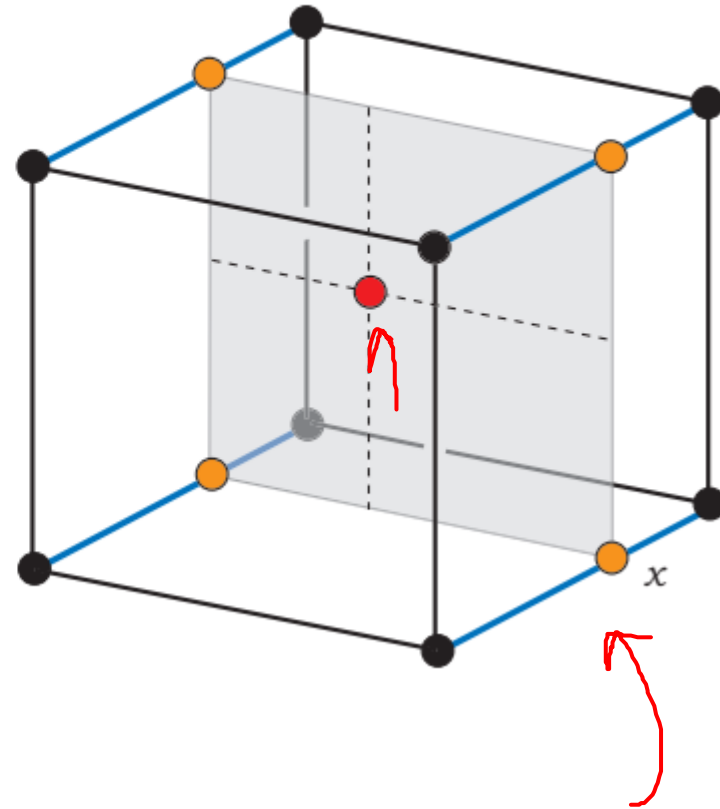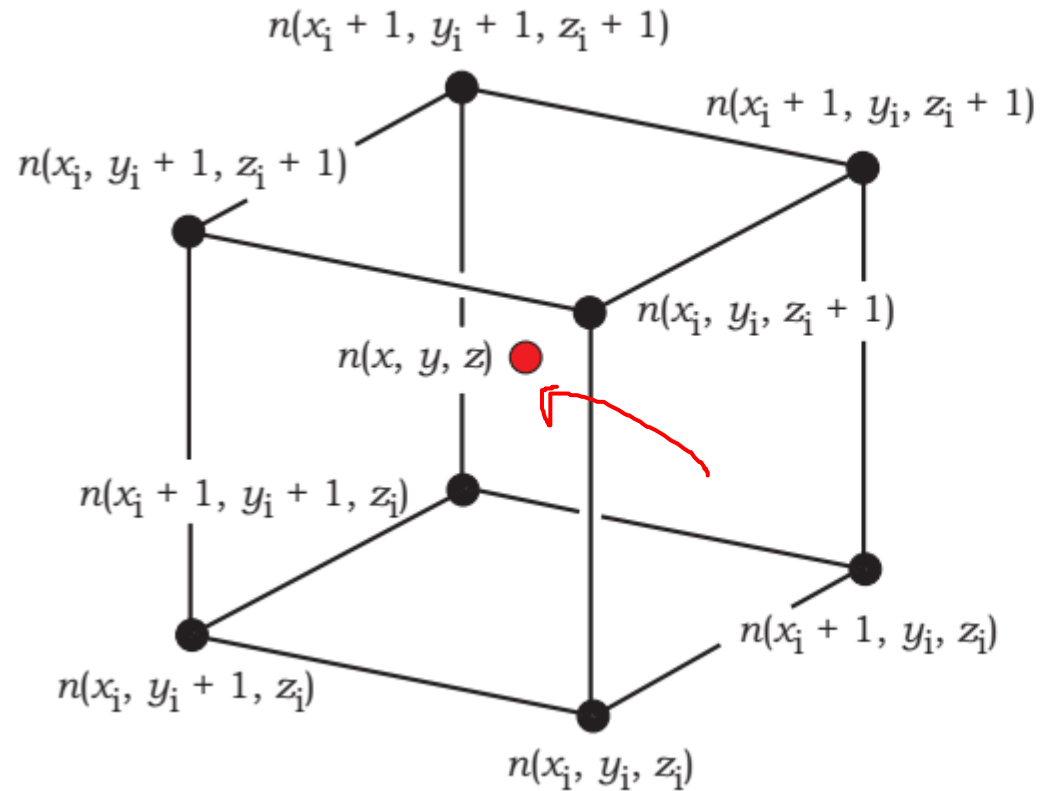
-1

Bilinear Interpolation
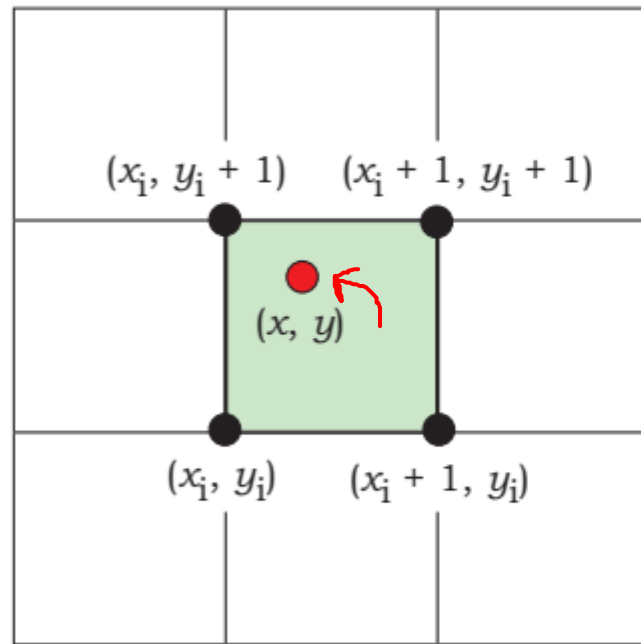
Bilinear Interpolation

$$n(x, y) = lerp(y - y_i, n(x, y_i), n(x, y_i + 1))$$
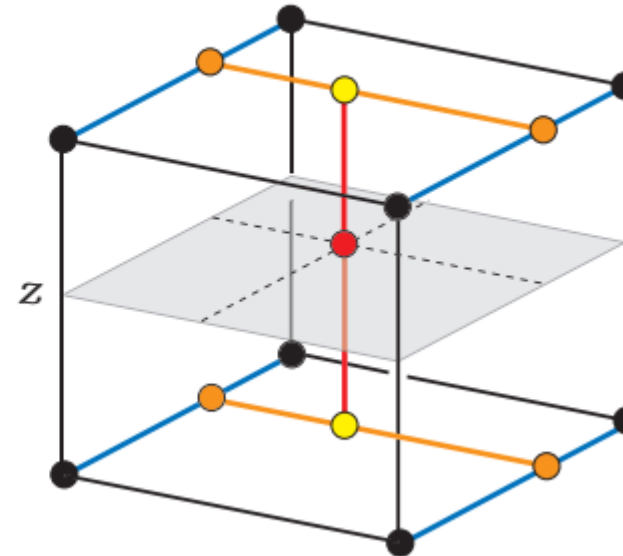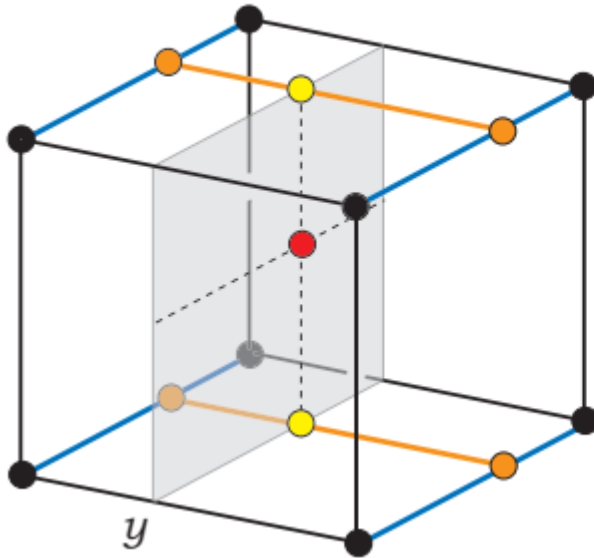
$$n(x, y_i) = lerp(x - x_i, n(x_i, y_i), n(x_i + 1, y_i))$$

$$n(x, y_i + 1) = lerp(x - x_i, n(x_i, y_i + 1), n(x_i + 1, y_i + 1))$$

Trilinear Interpolation

Trilinear Interpolation

Examples