CS 419: Production Rendering Fall 2018
In-class Worksheet 1

Quasi-Random Sequences

1. What are the first two points generated by the 2-dimensional Hammersley Sequence $p_i = (\frac{i}{n}, \Phi_2(i))$ when we generate a set containing 10 points?

2. What are the first two points generated by the 2,3 Halton Sequence $p_i = (\Phi_2(i), \Phi_3(i))$?

Filters

In ray-tracing, a filter will generate value for a given pixel by taking a weighted average of samples around that pixel center. The weights used are usually generated by a function $w(d_i)$ of the distance d_i from a sample location to the pixel-center: $p = \frac{\sum w(d_i)s(x_i,y_i)}{\sum w(d_i)}$

3. Suppose we use the following weight function:
   $w(x, y) = \frac{1}{n}$ when filtering using *n* samples.
   How would categorize the filter?
   a. Box Filter
   b. Tent Filter
   c. Cubic Filter
   d. Gaussian Filter

Intersections

4. Derive a formula for intersecting a ray and a parabolic cylinder given by $x^2 = 4y$.