MP468C — Computational Physics 2 — Lab 02

1. Use inverse transform sampling to generate a set of random numbers Y with the distribution

$$p(y) = \sin(2y), \qquad 0 < y < \pi/2$$

and zero elsewhere.

Verify numerically that your numbers have the desired distribution, by superposing a plot of $p(y)$ on a normalized histogram of the numbers you have obtained.

2. Use rejection sampling (the rejection method) to generate a set of random numbers R with the distribution

$$p(r) = \begin{cases} \sqrt{1-r^2}\exp\left(-\frac{r^2}{2a^2}\right) & -1 < r < 1 \\ 0 & \text{otherwise} \end{cases}$$

where a is a positive constant.

Do this with two different covering functions:

(a) constant function (use python's uniform prng)

(b) Gaussian function (use python's Gaussian prng)

Report the efficiency (fraction accepted) in each case.

Of course, you should verify numerically that your numbers have the desired distribution.

You might want to start with $a = 1$ and (if you want) experiment with other values afterwards.