Given, $P(x) \propto \frac{1}{x}$

Now, $$P(x) = \frac{x^{-1}}{\int_1^T x^{-1} dx} = \frac{1}{x \log T}$$

and $$P_c = \int_1^x dy \; P(y) = \frac{\log x}{\log T}$$

If we take $P(x) = r$

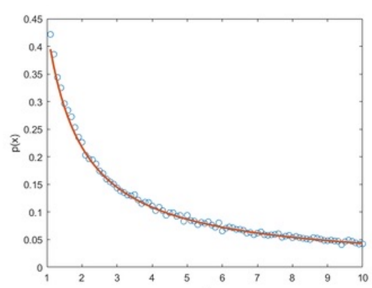
$$\Rightarrow x = \frac{1}{r \log T}$$

That means uniform distribution of $x \in [0, 1)$ gives us $\frac{1}{r \log T} \in [1, T)$

Language : Matlab

Source code : Problem_1.m

figure : Problem_1.png



The distribution plot.