Problem 3

Let's look at the boundary where:

$$u = \sqrt{exp(-\lambda(v/u))} \tag{1}$$

$$u = exp(-\lambda(v/2u)). \tag{2}$$

We can invert this to obtain the boundary for v.

$$v = -\frac{2u \ln u}{\lambda} \tag{3}$$

Then the maxima for v (where $u \leq 1$) is:

$$\frac{\partial v}{\partial u} = 0$$

$$-2 \ln u - 2 = 0$$

$$u = e^{-1}.$$

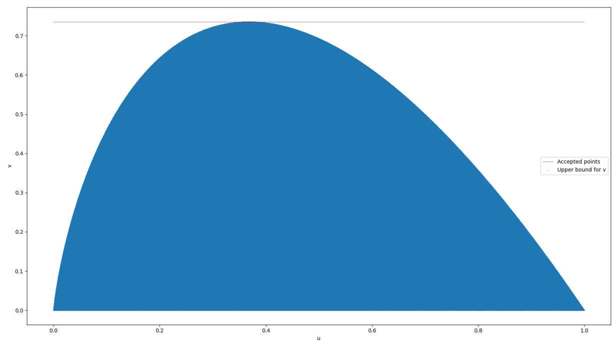
Hence,

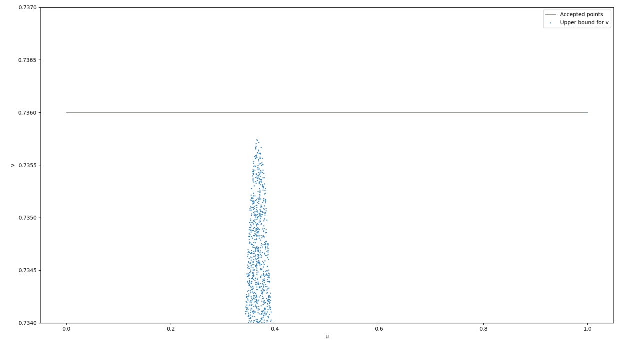
$$\boxed{\max(v) = \frac{2}{e\lambda}} \tag{4}$$

which is around 0.736 for $\lambda = 1$. Since we cut-off our exponential distribution at zero, we can write:

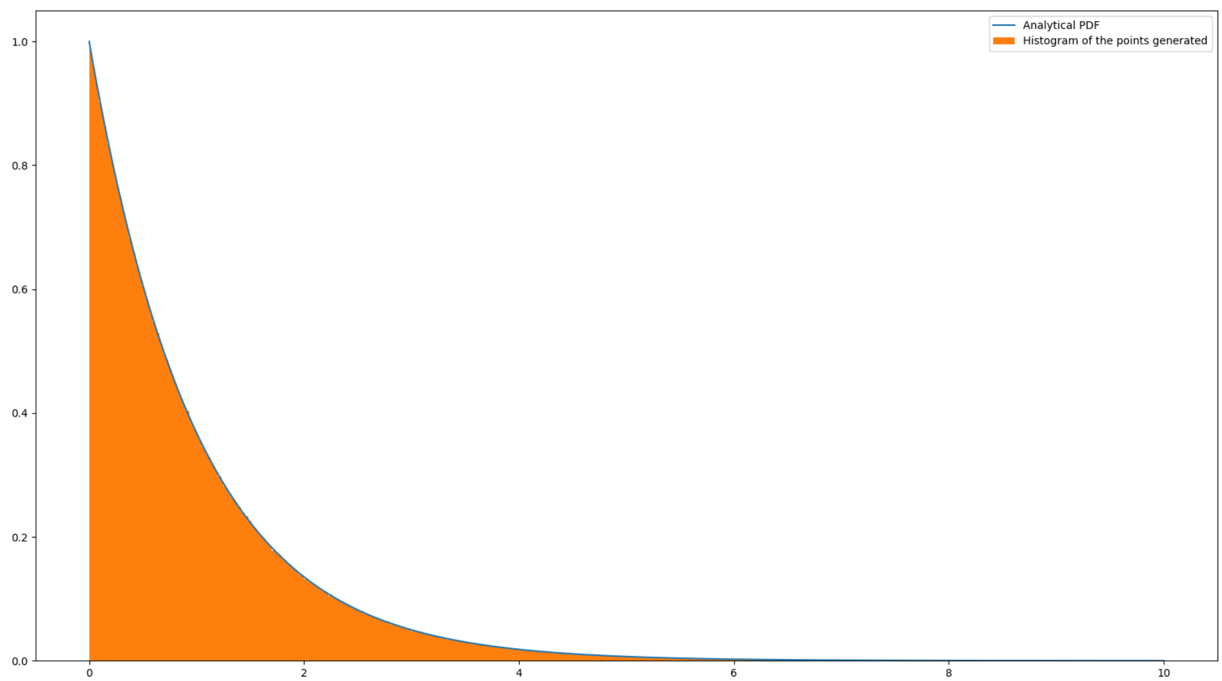
$$0 \leq v \leq \frac{2}{e\lambda}. \tag{5}$$

As you can see below, the bound on v is indeed correct - although you do have to zoom in.





Then, the histogram looks like:



where the method is about 68% efficient (in terms of points used out of all the points drawn).