In [1]:
```
import sys
sys.path.append('../')
```

In [2]:
```
import numpy as np
from neuro_models.poisson_process import PoissonProcess
```

Part a

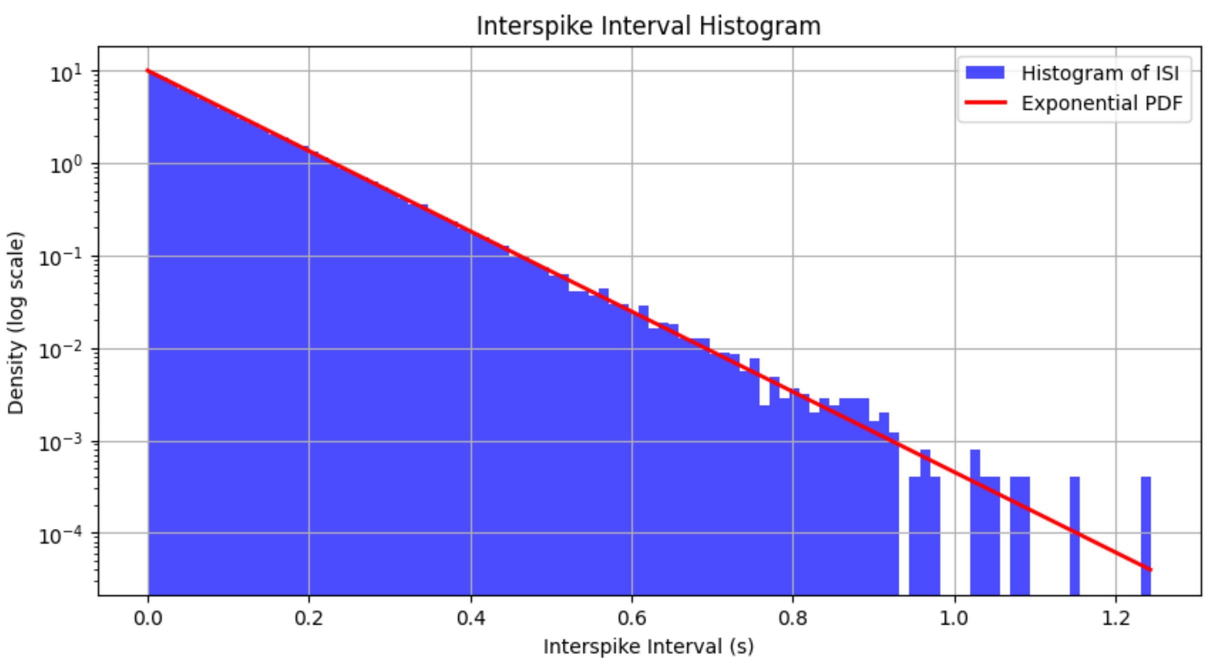
In [3]:
```
param = {
    "firing rate": 10,
    "T": 10,
    "realizations": 1000
    }
pp = PoissonProcess(param)

isi = pp.isi
spikes = pp.spike_times
```

In [25]:
```
pp.simulate_interspike_intervals()
print(f"Fano Factor for 1000 realizations of Poisson process: {pp.compute_fano_fact
```

```
Fano Factor for 1000 realizations of Poisson process: 0.9672335879552751
```

In [26]:
```
pp.plot_interspike_intervals()
```



Results are consistent with the predictions of the Poisson process. The Fano Factor (estimate which was calculated using sample mean and sample variance) in this case is ≈ 0.97, which is consistent with what we expect from 1000 Poisson process realizations. The variability is due to the stochasticity of the number of spikes in each realization of the Poisson process.

Further, the plot above shows (on a log scale) that the interspike intervals we observed from the realizations of the Poisson process are closely matching the exponential distribution with the firing rates as the rate parameter. The increased noise at the tail end of the curve is due to the fact that interspike intervals are exponentially distributed and thus, more less likey to take on values that large or larger, reducing the number of samples at those ranges and increasing noise.

In [27]:
```
pp.plot_interspike_intervals(scale="")
```