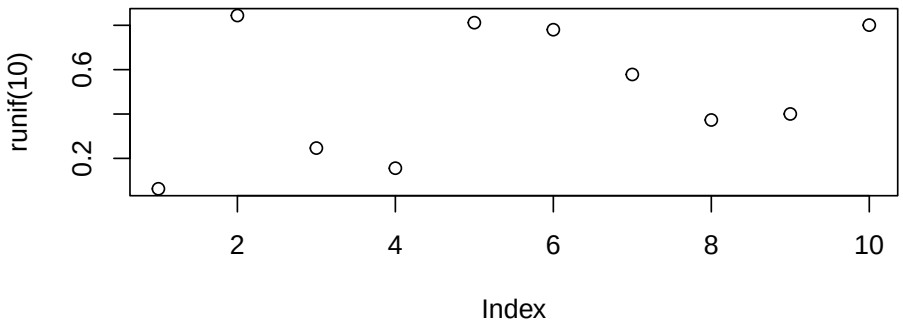
1. Consider the below outputs generated in R.

(a) (5 Points) Please write the down the R command that will provide the below plot. Describe in detail what the points in the plot represent.



(b) The following R code simulates a random variable X

```
> L = 10
> i = 0
> U = runif(1, min=0, max =1)
> Y = -log(U)/L
> Sum = Y
> while (Sum<1) {
+     U = runif(1, min=0, max =1)
+     Y = -log(U)/L
+     Sum = Sum +Y
+     i = i + 1
+ }
> X = i
```

(i) (10 points) Find $P(X = 0)$ and $P(X \geq 1)$.

(ii) (10 points) Suppose for $\lambda > 0$ and $T_1, T_2, \ldots T_n$ being i.i.d. Exp(λ) random variables it is known that for all $a > 0$,

$$P(\sum_{i=1}^{n} T_i \leq a) = \int_0^a \frac{\lambda^n}{n-1!} e^{-\lambda z} z^{n-1} dz$$

then find $P(X = n)$ for $n \geq 1$.