Ch6.Q2

16 October 2020 10:09

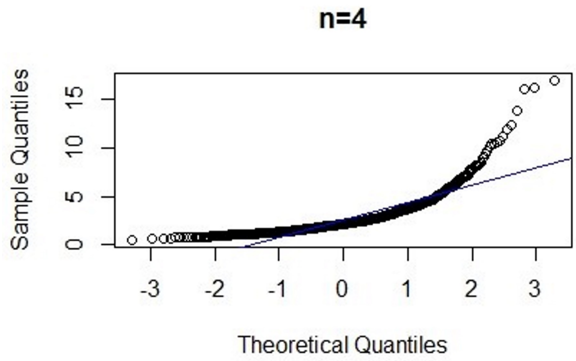
Let $X \stackrel{d}{=} Exp(\lambda)$

$\Rightarrow \quad \mathbb{E}[X] = \frac{1}{\lambda}$

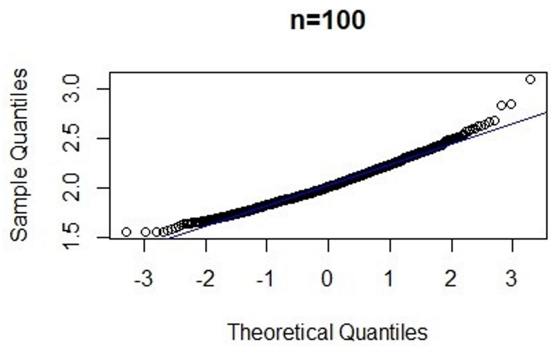
By MoM $\quad \mathbb{E}[X] = m_1$

$\Rightarrow \boxed{\lambda = \frac{1}{m_1}}$

```
> n=4
> lambda=2
> for (i in c(1:1000)) {
> lambda_estimator=rep(0,1000)
+   lambda_estimator[i]=1/mean(rexp(n,lambda))
+ }
> qqnorm(lambda_estimator,main="n=4")
>
abline(mean(lambda_estimator),sd(lambda_estimator),col='bl
ue')
```




```
n=100
> lambda=2
> lambda_estimator=rep(0,1000)
> for (i in c(1:1000)) {
+   lambda_estimator[i]=1/mean(rexp(n,lambda))
+ }
> qqnorm(lambda_estimator,main="n=100")
>
abline(mean(lambda_estimator),sd(lambda_estimator)
,col='blue')
```



We can observe that when we increase n then variation in the estimation of lambda decreases and also the values of lambda fit normal distribution more accurately.
This means that the reciprocal of mean (which is distributed normally itself due to CLT) will also resemble normal distribution when we increase n.