AUA CS108, Statistics, Fall 2020

Lecture 22

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Example

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and X_n are defined on the same Probability Space. Which of the followings are true (use only the definitions):

- $X_n \xrightarrow{\mathbb{P}} 0$;
- $X_n \xrightarrow{qm} 0$;
- $X_n \xrightarrow{D} 0$?

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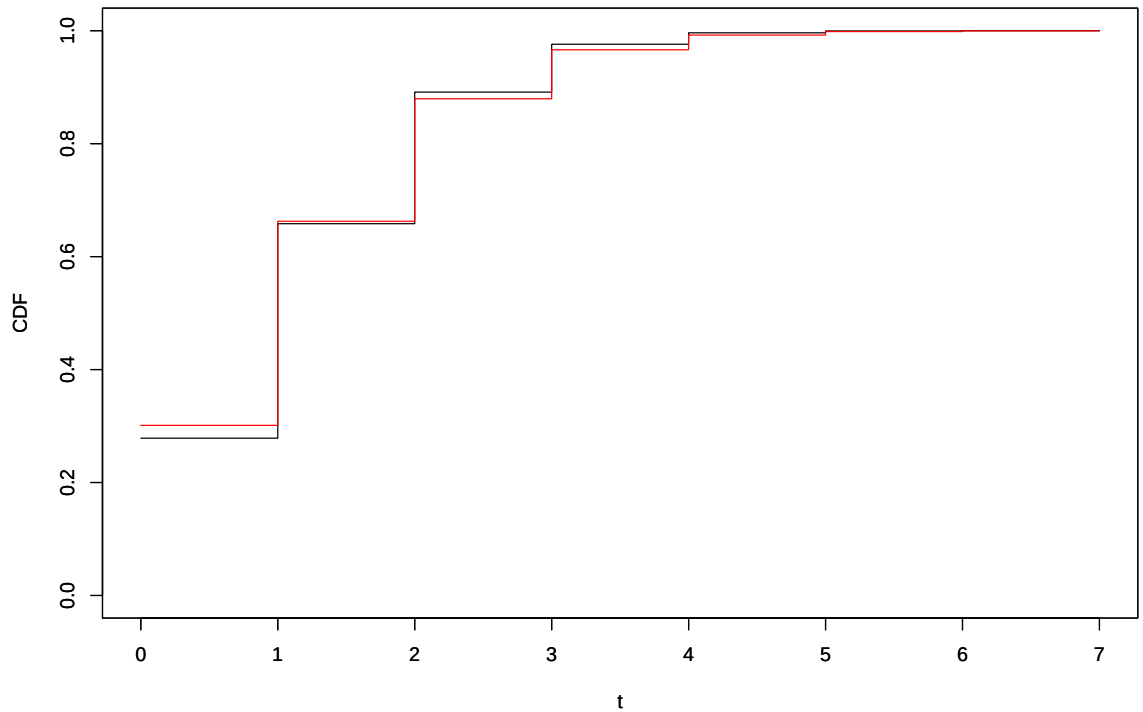
```
lambda <- 1.2; n <- 10; t <- seq(0,7, 0.1)
plot(t,pbinom(t, size = n, prob = lambda/n), type = "s", ylim = c(0,1), ylab = "CDF")
par(new = T)
plot(t, ppois(t, lambda = lambda), type = "s", col = "red", ylim = c(0,1), ylab = "CDF")
```



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Example: Let $X_n \sim Unif[0, n]$. Find the limit in Distributions of $Y_n = \frac{X_n}{n}$. Let us visually show that $Y_n \xrightarrow{D} Y$, where $Y \sim Unif[0, 1]$.

```
n <- 10000 ## We use Y_n
m <- 10000 ## No. of generated numbers
y <- runif(m, min = 0, max = n)/n
hist(y, freq = F)
abline(h = 1, col = "red", lwd = 2)
```