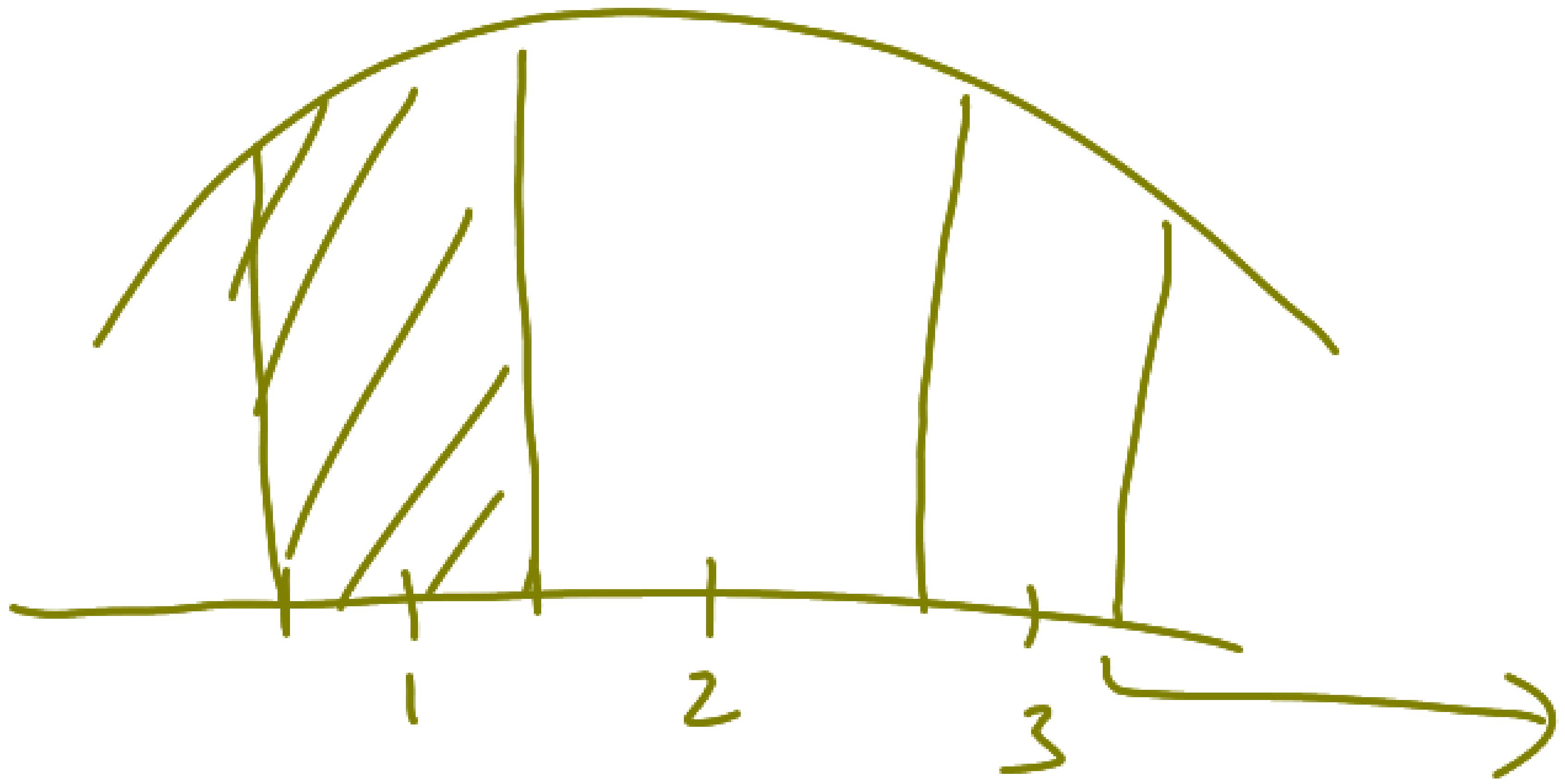
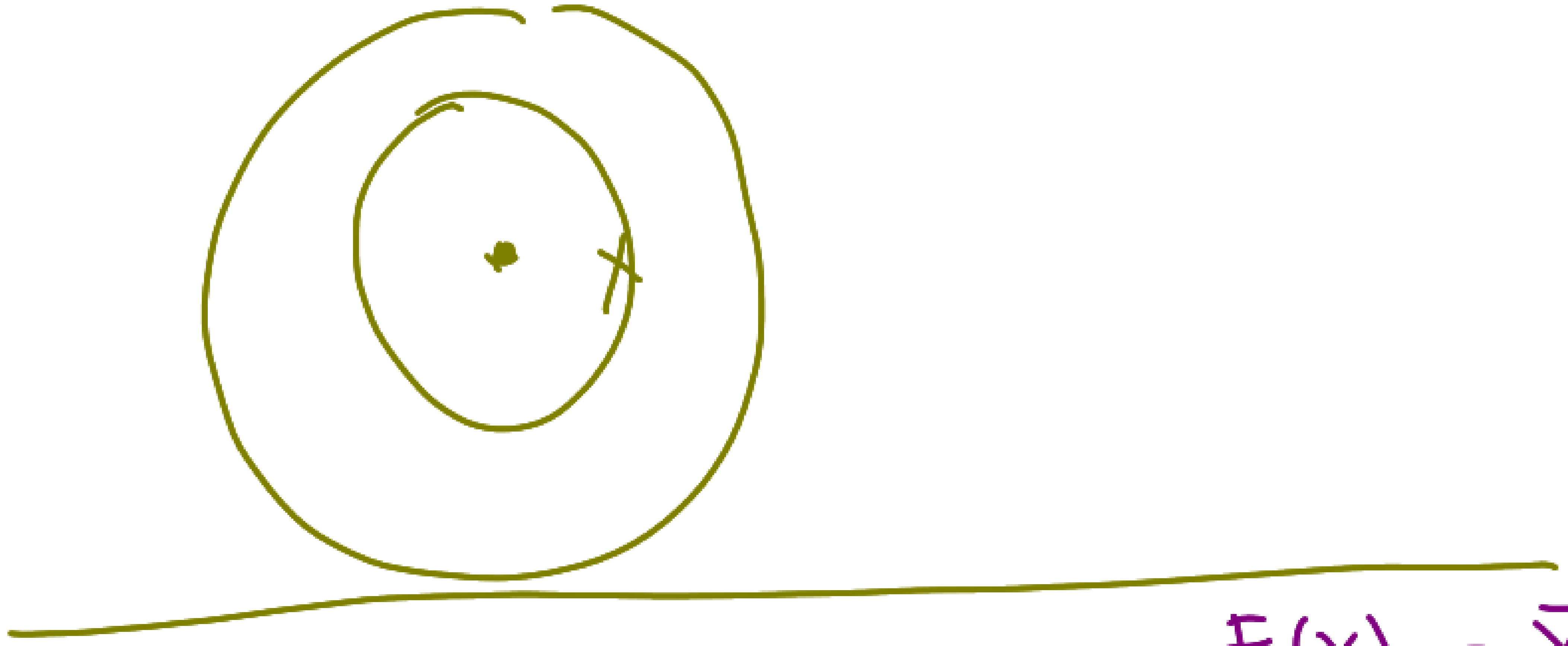


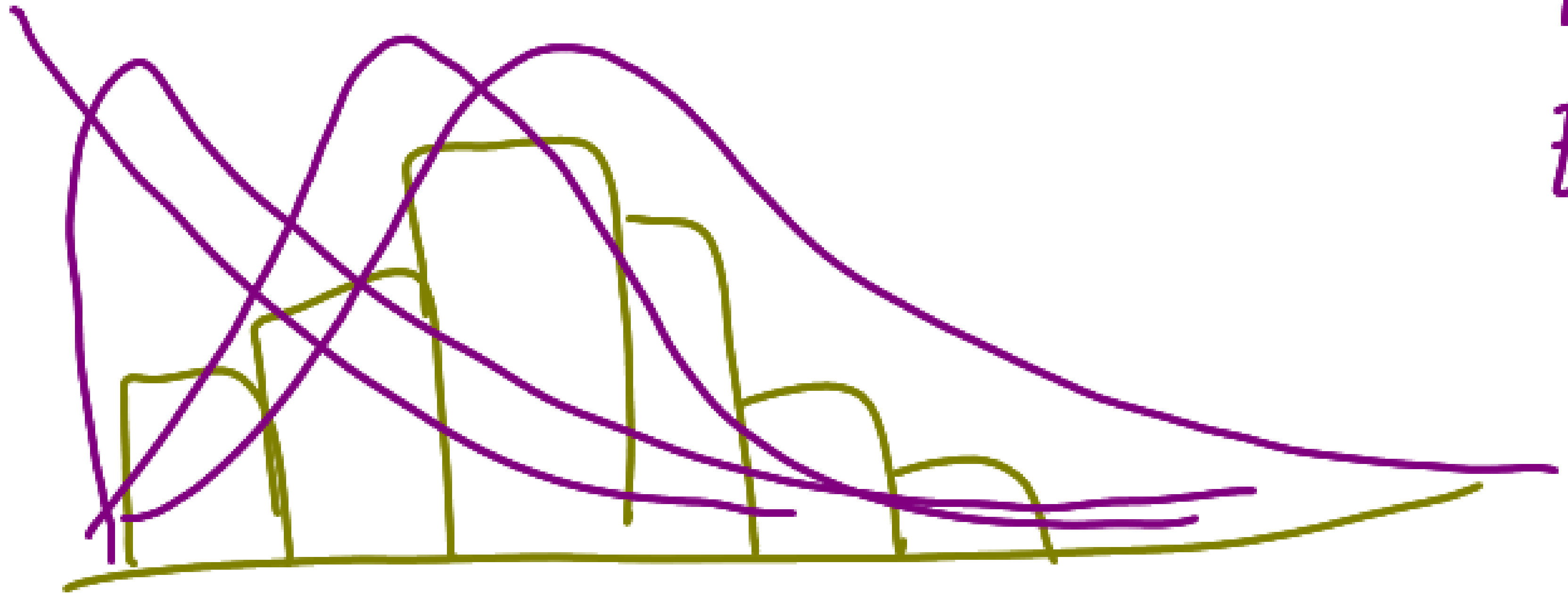


$$2(\bar{x}-\mu)\sum_{i=1}^{n}(x_i-\mu) = 2(\bar{x}-\mu)\left[\underbrace{\sum x_i}_{n\bar{x}} - n\mu\right]$$

$$= 2n(\bar{x}-\mu)^2$$

$E(X) = \bar{X}$

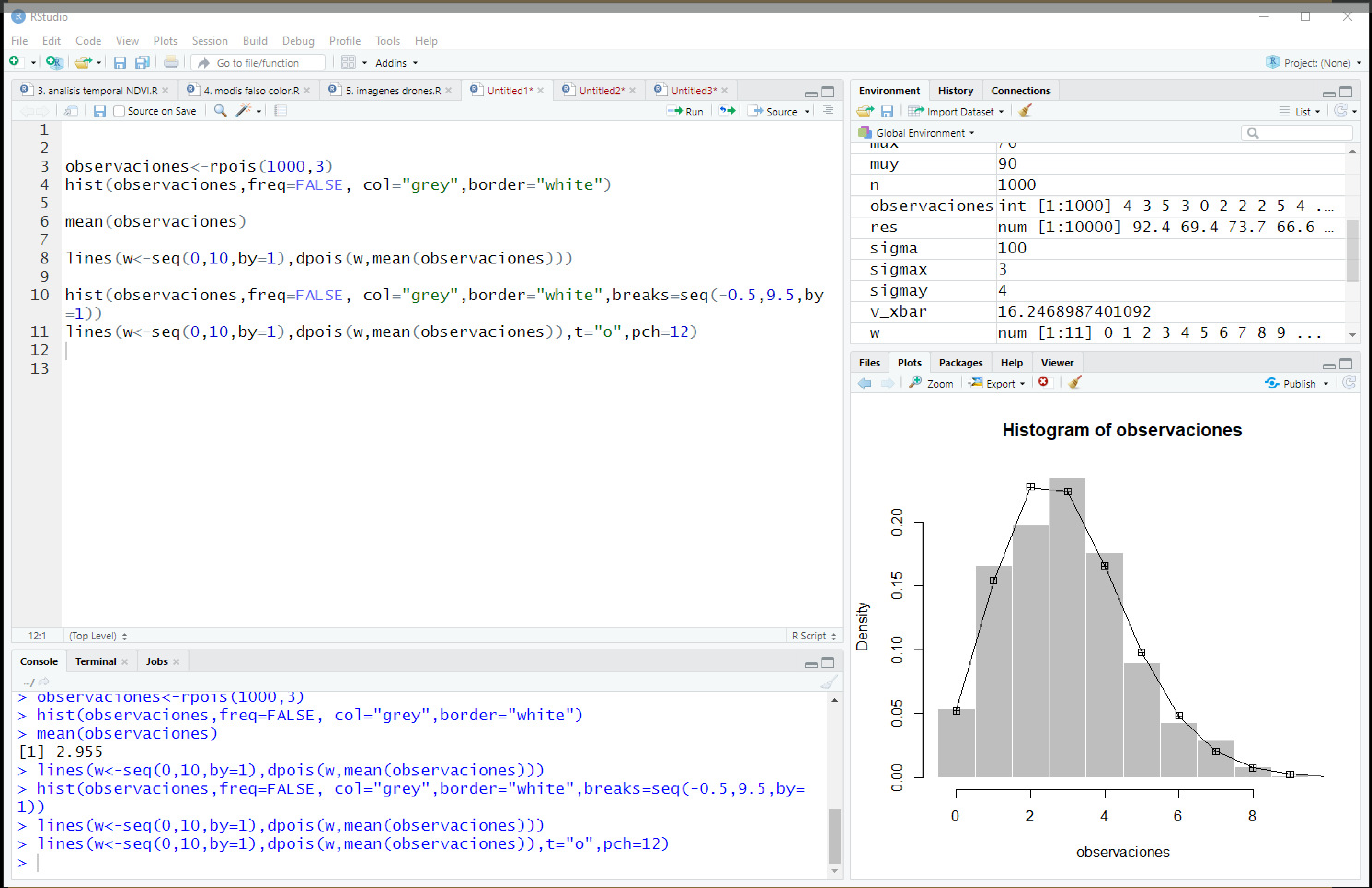
$E(X^2) = \frac{\sum x_i^2}{n}$



$X \sim Pois(\lambda)$

$E(X) = \lambda \quad = \quad \bar{X}$

$\hat{\lambda} = \bar{X}$


RStudio
File Edit Code View Plots Session Build Debug Profile Tools Help
Go to file/function
Addins
Project: (None)
3. analisis temporal NDVI.R
4. modis falso color.R
5. imagenes drones.R
Untitled1*
Untitled2*
Untitled3*
Source on Save
Run
Source
observaciones<-rpois(1000,3)
hist(observaciones,freq=FALSE, col="grey",border="white")
mean(observaciones)
lines(w<-seq(0,10,by=1),dpois(w,mean(observaciones)))
hist(observaciones,freq=FALSE, col="grey",border="white",breaks=seq(-0.5,9.5,by=1))
lines(w<-seq(0,10,by=1),dpois(w,mean(observaciones)),t="o",pch=12)
12:1
(Top Level)
R Script
Environment
History
Connections
Import Dataset
List
Global Environment
muy 90
n 1000
observaciones int [1:1000] 4 3 5 3 0 2 2 2 5 4 ...
res num [1:10000] 92.4 69.4 73.7 66.6 ...
sigma 100
sigmax 3
sigmay 4
v_xbar 16.2468987401092
w num [1:11] 0 1 2 3 4 5 6 7 8 9 ...
Console
Terminal
Jobs
~/
> observaciones<-rpois(1000,3)
> hist(observaciones,freq=FALSE, col="grey",border="white")
> mean(observaciones)
[1] 2.955
> lines(w<-seq(0,10,by=1),dpois(w,mean(observaciones)))
> hist(observaciones,freq=FALSE, col="grey",border="white",breaks=seq(-0.5,9.5,by=1))
> lines(w<-seq(0,10,by=1),dpois(w,mean(observaciones)))
> lines(w<-seq(0,10,by=1),dpois(w,mean(observaciones)),t="o",pch=12)
Files
Plots
Packages
Help
Viewer
Zoom
Export
Publish
Histogram of observaciones
Density
0.00
0.05
0.10
0.15
0.20
0
2
4
6
8
observaciones

$X \sim Pois(\lambda)$

$\theta = \frac{\lambda}{2}$ $\quad X \sim Pois(2\theta)$ $\quad P(X=x) = \frac{2\theta^x e^{-2\theta}}{x!}$

$\tilde{\theta} = \frac{\overline{X}}{2}$ $\quad \hat{\lambda} = \overline{X}$

$g(\hat{\lambda}) \overset{?}{=} g(\overline{X})$

$l'(\lambda) = \frac{\sum x_i}{\lambda} - n = 0$

$\Leftrightarrow \lambda = \frac{\sum x_i}{n} = \overline{x}$

$l''(\lambda) = -\frac{\sum x_i}{\lambda^2} < 0$

$\therefore \hat{\lambda}_{MV} = \overline{x}$

$$L(\lambda) = \frac{\lambda^{\sum x_i} e^{-n\lambda}}{\prod x_i!} \propto \lambda^{\sum x_i} e^{-n\lambda}$$

$$l(\lambda) = \log\left(\lambda^{\sum x_i} e^{-n\lambda}\right) = \log\left(\lambda^{\sum x_i}\right) + \log\left(e^{-n\lambda}\right) = \left(\sum x_i\right)\log(\lambda) - n\lambda$$

Tiempos de falla $X_1, \dots, X_n$ m.a de X

$X \sim exp(\lambda)$ Se observan las fallas hasta el tiempo $M > 0$

$f(x) = \frac{1}{\lambda} e^{-x/\lambda} I_{(0,\infty)}(x)$

$E(X) = \lambda$

Se observan $x_1, \dots, x_m$ fallos menores a M

$$L(\lambda) = \left(\frac{1}{\lambda} e^{-x_1/\lambda}\right)\left(\frac{1}{\lambda} e^{-x_2/\lambda}\right) \cdots \cdots \left(\frac{1}{\lambda} e^{-x_m/\lambda}\right) P(X_{m+1} \geq M) \cdots P(X_n \geq M)$$

$$= \left(\frac{1}{\lambda}\right)^m e^{-\sum_{i=1}^{m} \frac{x_i}{\lambda}} \left(e^{-M/\lambda}\right)^{n-m}$$

$$\propto \frac{1}{\lambda^m} e^{-\frac{1}{\lambda}\left[\sum_{i=1}^{m} x_i + (n-m)M\right]}$$

$$\ell(\lambda) = -\frac{1}{\lambda}\left[\sum_{i=1}^{m} x_i + (n-m)M\right] - m\log(\lambda)$$

$P(X_i \geq M)$

$= 1 - P(X_i < M)$

$= 1 - (1 - e^{-M/\lambda})$

$= e^{-M/\lambda}$

$f(x) = \theta e^{-x\theta}$ $E(X) = \frac{1}{\theta}$

$$l(\lambda) = -m\ln\lambda + \left(-\frac{1}{\lambda}\right)\underbrace{\left[\sum_{i=1}^{m} X_i + (n-m)M\right]}_{h}$$

$$l'(\lambda) = -m\frac{1}{\lambda} + \frac{1}{\lambda^2}h = 0$$

$$\Rightarrow \quad -m\frac{1}{\lambda} + \frac{1}{\lambda^2}h = 0 \quad \Leftrightarrow \quad -m\lambda + 1h = 0$$

$$\lambda_0 = \frac{1h}{m} = \frac{1}{m}\left[\sum_{i=1}^{m} X_i + (n-m)M\right]$$

$$l''(\lambda) = \frac{m}{\lambda^2} - \frac{2h}{\lambda^3} \quad . \quad l''(\lambda_0) = \frac{m}{\left(\frac{h}{m}\right)^2} - \frac{2h}{\left(\frac{h}{m}\right)^3} = \frac{m^3}{h^2} - \frac{2m^3}{h^2} < 0$$

$$\therefore \hat{\lambda}_{MV} = \lambda_0$$

$X \sim N(0,1)$ $\quad \underline{Y = e^{X}}$ $\quad x \in \mathbb{R}$ $\quad f(x) = \frac{1}{\sqrt{2\pi}} \exp\left(-x^2/2\right)$

a. PDF Y

$w(y) = \ln(y)$ $\quad w'(y) = \frac{1}{y}$ $\quad f_Y(y) = \frac{1}{y} f(\ln y)$

$$\therefore f_Y(y) = \frac{1}{y\sqrt{2\pi}} \exp\left(-(\ln y)^2/2\right) \quad \text{con} \quad y > 0$$

b.

$$E(y) = \int_{-\infty}^{\infty} y f_Y(y)\, dy = \int_{0}^{\infty} y \frac{1}{y\sqrt{2\pi}} \exp\left(-\underline{(\ln y)}^2/2\right) dy$$

$\int_{(0,\infty)}$ $\quad \int_{[0,\infty)}$

$$\left[\begin{aligned} v &= \ln y \\ dv &= \frac{1}{y} \\ y &= e^{v} \end{aligned}\right]$$

$$E(Y)=\int_{-\infty}^{\infty} e^{v}\cdot\frac{1}{\sqrt{2\pi}}\,e^{-\frac{v^2}{2}}\,dv=\int_{-\infty}^{\infty}\frac{1}{\sqrt{2\pi}}\,e^{-\frac{1}{2}(v^2-2v+1)}\cdot e^{1/2}\,dv$$

$$=e^{1/2}\underbrace{\int_{-\infty}^{\infty}\frac{1}{\sqrt{2\pi}}\,e^{-\frac{1}{2}(v-1)^2}\,dv}_{N(1,1)}=e^{1/2}$$

*

$$E(y^2)\,\cancel{V(y_2)} = \int_0^\infty y^2 \frac{1}{y\sqrt{2\pi}} \exp\left(-(\ln y)^2/2\right) dy$$

$$v = \ln y \quad - \quad dv = \frac{1}{y}$$

$$y = e^v$$

$$= \int_{-\infty}^{\infty} e^{2v} \frac{1}{\sqrt{2\pi}} \exp\left(\frac{-v^2}{2}\right) dv = \int_{-\infty}^{\infty} \frac{1}{\sqrt{2\pi}} \exp\left(\frac{-1}{2}\left(v^2-4v+4\right)\right) e^2\, dv$$

$$= e^2 \underbrace{\int_{-\infty}^{\infty} \frac{1}{\sqrt{2\pi}} \exp\left(-\frac{1}{2}(v-2)^2\right) dv}_{N(2,1)} = e^2$$

$$\therefore V(Y) = e^2 - \left(e^{1/2}\right)^2$$

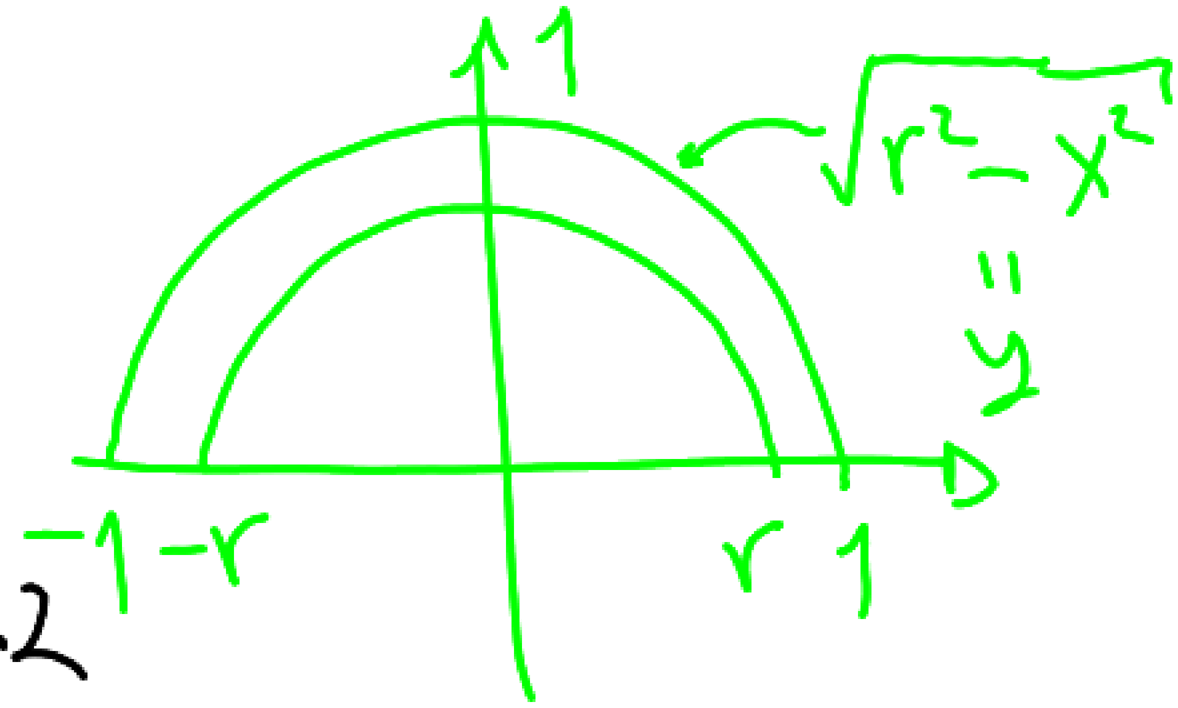
$$= e^2 - e.$$

$$(X,Y) \sim U\left(\{(x,y) \mid x^2+y^2 \leq 1\}\right) \qquad \therefore\ f(x,y) = \frac{1}{\pi}$$

$$R = \sqrt{x^2+y^2}$$

$$F_R(r) = P(R<r) = \begin{cases} P\left(\{(x,y) : \sqrt{x^2+y^2} \leq r\}\right) & 0 \leq r \leq 1 \\ 1 \quad \text{si} \quad r>1 \end{cases}$$

$$= \int_{-r}^{r} \int_{-\sqrt{r^2-x^2}}^{\sqrt{r^2-x^2}} \frac{1}{\pi}\, dy\, dx = 2\int_{-r}^{r} \int_{0}^{\sqrt{r^2-x^2}} \frac{1}{\pi}\, dy\, dx = r^2$$



$$\frac{A_r}{A_T} = \frac{\pi r^2}{\pi 1^2} = r^2$$

$$f_R(r) = 2r\, I_{(0,1)}(r)$$