EDA-Question 1

Wednesday, February 12, 2025 8:04 PM

1. $m(a+bx) = a + b\,m(x)$

$\frac{1}{N}\sum_{i=1}^{N} a+bx_i$

$\frac{1}{N}\left(\sum_{i=1}^{N} a + \sum_{i=1}^{N} bx_i\right)$

$\frac{1}{N}\left(Na + b\sum_{i=1}^{N} x_i\right)$

$a + b\frac{1}{N}\sum_{i=1}^{N} x_i$

$a + b\,m(x)$

$m(X)$

$\frac{1}{N}\sum_{i=1}^{N} a+bx_i$

2.) $\mathrm{cov}(X, a+bY) = b \times \mathrm{cov}(X,Y)$

$m(a+bY)$

$m(a)+m(bY)$

$a + b\,m(Y)$

$\frac{1}{N}\sum_{i=1}^{N}(x_i - m(x))(y_i - m(Y))$

$\frac{1}{N}\sum_{i=1}^{N}(x_i - m(x))(a+by_i - m(a+bY))$

$\frac{1}{N}\sum_{i=1}^{N}(x_i - m(x))\,(a+by_i - (a+bm(Y)))$

$a + by_i - a - bm(Y)$

$(by_i - bm(Y))$

$\frac{1}{N}\sum_{i=1}^{N}(x_i - m(x))\,b(y_i - m(Y))$

$b \times \frac{1}{N}\sum_{i=1}^{N}(x_i - m(x))(y_i - m(Y))$

$b \times \mathrm{cov}(X,Y)$

3. $\mathrm{Cov}(a+bx, a+bx) = b^2\,\mathrm{cov}(x,x)$

$\frac{1}{N}\sum_{i=1}^{N}\left((a+bx_i - m(a+bx))(a+bx_i - m(a+b(x))\right)$

$m(a)+m(bY)$

$a+bm(Y)$

$\frac{1}{N}\sum_{i=1}^{N}(a+bx_i - a - bm(x))(a+bx_i - a - bm(x))$

$\frac{1}{N}\sum_{i=1}^{N}(bx_i - bm(x))\,(bx_i - bm(x))$

$b(x_i - m(x))\;b(x_i - m(x))$

$b^2\,\frac{1}{N}\sum_{i=1}^{N}(x_i - m(x))(x_i - m(x))$

$b^2 \cdot \mathrm{cov}(x,x)$

$\mathrm{cov}(x,x)$

$\frac{1}{N}\sum_{i=1}^{N}(x_i - m(x))(x_i - m(x))$

$\frac{1}{N}\sum_{i=1}^{N}(x_i - m(x))^2 = s^2$

$\mathrm{cov}(x,x) = s^2$

4. the element