Ejercicio 6e

1) $m(a+bX) \stackrel{?}{=} a + b \cdot m(X)$

$\frac{1}{N}\sum_{i=1}^{N}(a+bX)$

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

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

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

$a + b\left(\frac{1}{N}\sum_{i=1}^{N} x\right) \stackrel{?}{=} a + b \cdot m(x)$

$\checkmark$

$\boxed{a + b(m(x)) = a + b \cdot m(x)}$

2) $cov(X,X) \stackrel{?}{=} s^2$

$\frac{1}{N}\left[\sum^{N}(x_i - m(x)) \cdot (x_i - m(x))\right]$

$\frac{1}{N}\left[\sum^{N}(x_i - m(x))^2\right] \stackrel{?}{=} s^2$

$\checkmark$

$\boxed{s^2 \stackrel{\checkmark}{=} s^2}$

3) $cov(X, a+bY) = b \cdot cov(X,Y)$

Rem #1)

$\frac{1}{N}\left[\sum^{N}(x_i - m(x))((a+by_i) - m(a+bY)\right]$ ↙

$\frac{1}{N}\left[\sum^{N}(x_i - m(x))((a+by_i) - (a+b(m(Y)))\right]$

$\frac{1}{N}\left[\sum^{N}(x_i - m(X))(\cancel{a} + by_i - \cancel{a} - b(m(Y)))\right]$

$\frac{1}{N}\left[\sum^{N}(x_i - m(X))(b(y_i - m(Y)))\right]$

$\checkmark$

$\boxed{b \cdot cov(X,Y) \stackrel{\checkmark}{=} b \cdot cov(X,Y)}$

4) $cov(a+bX, a+bY) = b^2 cov(X,Y)$

$\frac{1}{N}\left[\sum^{N}(a+bx_i) - m(a+bX))((a+by_i) - m(a+bY))\right]$

$\frac{1}{N}\left[\sum^{N}(a+bx_i) - (a+b\,m(X))(a+by_i - (a+b \cdot m(Y))\right]$

$\frac{1}{N}\left[\sum^{N} b(x_i - m(X))(b(y_i - m(Y)))\right]$

$b \cdot b\frac{1}{N}\left[\sum^{N}(x_i - m(x))(y_i - m(Y))\right]$

$\checkmark$

$\boxed{b^2 \cdot cov(X,Y) \stackrel{\checkmark}{=} b^2 cov(X,Y)}$

5) $mcd(a+bx) \stackrel{?}{=} a + b\,mcd(x)$

$\frac{1}{N}\left(\sum^{N} a + b x_i\right)$

$\frac{1}{N}\left(\sum^{N} a + \sum^{N} b x_i\right)$

$\frac{1}{N}\left(\sum a + b\sum^{N} x_i\right)$

$\frac{1}{N}\left(N(a) + b\sum^{N} x_i\right)$

$a + \frac{1}{N}(b)\left(\sum^{N} x_i\right)$

$\boxed{a + b(mcd(x) \stackrel{\checkmark}{=} a + b\,mcd(x)}$

$IQR(a+bX) \stackrel{?}{=} a + b \cdot IQR(X)$

$(a + b\,m_{.75}(x)) - (a + b\,m_{.25}(x))$

$\cancel{a} + b\,m_{.75}(x) \boxed{-a} - b\,m_{.25}(x)$

$b\,m_{.75}(x) - b\,m_{.25}(x) \stackrel{?}{=} a + b \cdot IQR(x)$

$\boxed{b \cdot IQR(x) \stackrel{\times}{=} a + b \cdot IQR(x)}$

6) $m(\sqrt{x}) \neq \sqrt{m(x)}$

$\frac{1}{2}\sum(2+4)$		$\sqrt{\frac{1}{2}(2+4)}$
$\frac{1}{2}(6)$		$\sqrt{\frac{1}{2}(6)}$
3	$\neq$	$\sqrt{3}$

$m(x^2) \neq (m(x))^2$

$\frac{1}{2}\sum(2+4)^2$		$(\frac{1}{2}\sum(2+4))^2$
$\frac{1}{2}(36)$		$(\frac{1}{2}((6))^2$
18	$\neq$	9