6.1)

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

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

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

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

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

$$m(a+bX) = a + b * m(X)$$

6.2)

$$\text{cov}(X,X) = \frac{1}{N}\sum_{i=1}^{N}(x_i - m(X))(x_i - m(X))$$

$$\text{cov}(X,X) = \frac{1}{N}\sum_{i=1}^{N}(x_i - m(X))^2$$

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

6.3)

$$A = a + bY$$

$$a_i = a + by_i$$

$$m(A) = a + b * m(Y)$$

$$a_i - m(A) = (a + by_i) - (a + b * m(Y))$$

$$a_i - m(A) = b(y_i - m(Y))$$

$$\text{cov}(X,A) = \frac{1}{N}\sum_{i=1}^{N}(x_i - m(X)) * b(y_i - m(Y))$$

6.3)

$$\operatorname{cov}(X, A) = b\left(\frac{1}{N}\sum_{i=1}^{N}(X_i - m(X))(Y_i - m(Y))\right)$$

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

6.4)

$$\operatorname{Cov}(a+bX, a+bY) = b \times \operatorname{cov}(a+bX, Y)$$

$$\operatorname{cov}(a+bX, Y) = b(b(\operatorname{cov}(X, Y)))$$

$$\operatorname{cov}(a+bX, a+bY) = b^2 \operatorname{cov}(X, Y)$$

6.5)

Yes, it's true because the order of the data is unaffected.

No, it's false because a shouldn't be included in $a + b \times IQR(X)$ because it doesn't affect outcome.

6.6)

$X = \{0, 6\}$

Mean $= 3$

$(m(X))^2 = 9$

$X^2 = \{0, 36\}$

Mean $= 18$

Mean x^2 (18) $\neq (m(x))^2$ (9)

$X = \{0, 8\}$

Mean $= 4$

$\sqrt{m(x)} = 2$

$\sqrt{x} = \{0, 2.83\}$

Mean $= 1.42$

Mean $\sqrt{x}$ (1.42) $\neq \sqrt{m(x)}$ (2)