# Solutions for quiz 6

1. (a)

$$\mathrm{V}(X) = \mathrm{E}(X^2) - (\mathrm{E}(X))^2 = 6 - (2)^2 = 6 - 4 = 2$$

(b) X and Y are independent. Therefore,

$$\mathrm{E}(XY) = \mathrm{E}(X)\mathrm{E}(Y) = 2 \cdot 1 = 2$$

(c) X and Y are independent and hence $\mathrm{Cov}(X, Y) = 0$. Therefore,

$$\mathrm{V}(2X + 3Y) = \mathrm{V}(2X) + \mathrm{V}(3Y) = 4\mathrm{V}(X) + 9\mathrm{V}(Y)$$

$$\mathrm{V}(Y) = \mathrm{E}(Y^2) - (\mathrm{E}(Y))^2 = 3 - 1 = 2$$

$$\mathrm{V}(2X + 3Y) = 4 \cdot 2 + 9 \cdot 2 = 26$$

(d)

$$\mathrm{Cov}(2X + 3Y, X) = 2\mathrm{Cov}(X, X) + 3\mathrm{Cov}(Y, X)$$

$$= 2\mathrm{V}(X) = 4$$

(e)

$$\rho(2X + 3Y, X) = \frac{\mathrm{Cov}(2X + 3Y, X)}{\sqrt{\mathrm{V}(2X + 3Y)}\sqrt{\mathrm{V}(X)}}$$

$$= \frac{4}{\sqrt{26}\sqrt{2}} \simeq .555$$