

1. Let X, Y be two random values on \mathbb{R} and $\alpha \in \mathbb{R}$ show that

(a) $\mathbb{E}(\alpha X) = \alpha \mathbb{E}(X)$

(b) $\mathbb{E}(X + Y) = \mathbb{E}(X) + \mathbb{E}(Y)$

(c) If in addition X, Y are independent show that

$$V(X + Y) = V(X) + V(Y)$$

2. Let $X \sim \mathcal{N}(\mu, \sigma^2)$ show directly using the probability density function that

(a) $\mathbb{E}(X) = \mu,$

(b) $V(X) = \sigma^2.$