

1. What is the expectation of a **discrete** random variable?

(1)

$$E(X) = \sum_{x \in S} x f(x)$$

2. What is the expectation of a **continuous** random variable?

(1)

$$E(X) = \int_{x \in \mathcal{R}} x f(x) dx$$

3. Give two ways to calculate the variance using expectation.

(2)

$$\begin{aligned} \text{Var}(X) &= E((X - E(X))^2) \\ &= E(X^2) - E(X)^2 \end{aligned}$$

4. Show how to use the mgf, $M_X(t)$ to find the third moment.

(1)

$$M_X'''(0)$$