111

Note Title 2/23/2011

What if X is a conti R.V.

Ex: X is exponential R.V with para λ

Find $\Phi_X(\omega)$?

Ans:

How to use $\Phi_X(\omega)$?

Ans: One way ~~of~~ using $\Phi_X(\omega)$ is the moment theorem

* For any discrete / conti / mixed type R.V X with $\Phi_X(\omega)$

Ex: X has $\Phi_X(\omega) = \dfrac{2}{2 - j\omega}$

Q: What type of R.Vs is X?

Ans:

Now we have
① pdf/pmf ② cdf
③ Characteristic function
to describe a R.V.

Q: $E(X) = ?$

Ans

Q: $E(X^2) = ?$

A

Q: $Var(X) = ?$

Ans:

(see Table 4.1)

* Characteristic function

$$\Phi_X(\omega) = E(e^{j\omega X})$$

Ex: X is Gaussian with μ, σ^2

Find $\Phi_X(\omega)$.

Ans:

Q $E(X) = ?$ $E(X^2) = ?$ $Var(X) = ?$

Ans:

① Characteristic function

$$\Phi_X(\omega) = E(e^{j\omega X})$$

Moment theorem

$$E(X^n) = \left(\frac{1}{j^n}\right)\left[\frac{d^n}{d\omega^n}\Phi_X(\omega)\right]_{\omega=0}$$

$\Phi_X(\omega)$: Fourier transform of $f_X(x)$

② If we know that X is always non-negative $P(X<0)=0$, then we can get rid of the "j" by considering the following

Q: How to compute a moment generation function?

A:

1118 Ex: Find the moment generation function of a Poisson R.V. w. para. α

Ans:

* One-way of using $X^*(s)$ is

the moment theorem

③ If we know that X is not only non-negative $P(X<0)=0$, but also outputs only integers, $S=\{0,1,2,\cdots\}$. The we have

Ex: X is a fair dice
$G_X(z)=?$

Ans:

Q: How to use $G_X(z)$? Two possibilities.

Ans: ①