Question 1:

X is a discrete random variable with a given PMF:

(a)

X={0.2,0.4,0.5,0.8,1}

(b) Find

P(X≤0.5):

Add the probabilities where X≤0.5:

P(X≤0.5)=P(X=0.2)+P(X=0.4)+P(X=0.5)=0.1+ 0.2+ 0.2=0.5

(c) Find P(0.25<X<0.75):

P(0.25<X<0.75)=P(X<0.75)-P(X<0.25)=P(X=0.4)+P(X=0.5)

0.2 +0.2=0.4

##

##Question 2:

X is a discrete random variable with a given PMF:

##

(a) Find E[X]E[X]E[X] (expected value):Use the formula:

E[X]= Σ XiP(Xi)

E[X]=(0.2)(0.1)+(0.4)(0.2)+(0.5)(0.2)+(0.8)(0.3)+(1)(0.2)

E[X]=0.02+0.08+0.1+0.24+0.2=0.64.

(b) Find Var(X)Var(X)Var(X) (variance):Use the formula:

Var(X)=E[X2]−(E[X])2

=(0.2*0.2)(0.1)+(0.4*0.4)(0.2)+(0.5*0.5)(0.2)+(0.8*0.8)(0.3)+(1)(0.2).

E[X2]=0.004+0.032+0.05+0.192+0.2=0.478.

Var(X)=E[X2]−(E[X])2

=0.478−(0.64)2=0.478−0.4096=0.0684

(c) E[Y]

Y=(X−2)2

E[Y]= Σ P(Xi)(Xi−2)2.

E[Y]=0.324+0.512+0.45+0.432+0.2=1.918.

##

##Question 3:

##

Var(2X−Y)=4Var(X)+Var(Y)=6

Var(X+2Y)=Var(X)+4Var(Y)=9.

Let Var(X)=a and Var(Y)=b

4a+b=6, a+4b=9.

16a+4b=24,

15a=15a=1

4(1)+b=6b=2

Var(X)=1,Var(Y)=2.

##

##Question 4:

##

> P(X=k)=(20k)0.5k(1−0.5)20−k
>
> P(X > 15) = P(X = 16) + P(X = 17) + P(X = 18) + P(X = 19) + P(X = 20)

##

##Question 4:

##

P(X=11)=0.0663

P(X=12)=0.0829

P(X=13)=0.0956

P(X=14)=0.1024

P(X=15)=0.1024

P(10<X≤15)=P(X=11)+P(X=12)+...+P(X=15).

P(X=k)=k!λke−λ.

P(10<X≤15)=0.0663+0.0829+0.0956+0.1024+0.1024=0.4496.

##

##Question 6:

##

Given the CDF F(X):

1. P(X=5)=F(5)−F(4)=0.75-.05=0.25

.1

2. P(2<X<5)=F(4)−F(2)=0.5-0.25= 0.25

3. P(X≥3)=1−F(2)=1-0.25=7

##

##Question 7:

##

1. **Mean**:
1. μ=np=200.5=10.
2. **Variance**:
2. σ2=np(1−p)=200.50.5=5.