**MAT217 OLASILIK**

**FORMÜL KAĞIDI**

$$F(X_0)=P(X\le x_0)$$

$$\mu=E(X)=\sum_x x.P(X=x)$$

$$\mu=E(X)=\int x.f(x)dx$$

$$E(a)=a$$

$$E(aX+b)=a.E(X)+b$$

$$Var(X)=V(X)=\sigma^2=\sum_x (x-\mu)^2 P(X=x)$$

$$Var(X)=V(X)=\sigma^2=\int (x-\mu)^2 P(X=x)$$

$$Var(X)=V(X)=\sigma^2=E(X^2)-[E(X)]^2$$

$$Var(aX+b)=a^2Var(X)$$

$$g(x)=\sum\nolimits_y f(x,y) \qquad g(x)=\int_y f(x,y)\,dy$$

$$h(y)=\sum\nolimits_x f(x,y) \qquad h(y)=\int_x f(x,y)\,dx$$

$$f(x|y)=\frac{f(x,y)}{h(y)} \qquad f(y|x)=\frac{f(x,y)}{g(x)}$$

$$\mu_{g(x,y)}=E[g(x,y)]=\sum_x\sum_y g(x,y)f(x,y)$$

$$\mu_{g(x,y)}=E[g(x,y)]=\int_x\int_y g(x,y)f(x,y)dy\,dx$$

$$Cov(X,Y)=E\big[(X-\mu_x)(Y-\mu_y)\big]=E(XY)-\mu_x\mu_y$$

$$Cov(X,Y)=E\big[(X-\mu_x)(Y-\mu_y)\big]=\sum_x\sum_y (x-\mu_x)(y-\mu_y)f(x,y)$$

$$Cov(X,Y)=E\big[(X-\mu_x)(Y-\mu_y)\big]=\int_y\int_x (x-\mu_x)(y-\mu_y)f(x,y)\,dx\,dy$$

$$\rho_{XY}=Corr(X,Y)=\frac{Cov(X,Y)}{\sqrt{Var(X).Var(Y)}}=\frac{Cov(X,Y)}{\sigma_X\sigma_Y}$$

**Kesikli Uniform Dağılım**

$$P(X=x)=\begin{cases}\dfrac{1}{k} & x=1,2,3,\ldots,k\\ 0 & \text{d.d.}\end{cases} \qquad E(x)=\frac{k.(k+1)}{2}, \qquad Var(x)=\frac{(k-1).(k+1)}{12}$$

**Bernoulli Dağılımı**

$$P(X=x)=\begin{cases} p^x.(1\text{-}p)^{1\text{-}x} & x=0,1 \\ 0 & d.d. \end{cases} \qquad E(x)=p, \qquad Var(x)=p.(1-p)$$

**Binom Dağılımı**

$$P(X=x)=\begin{cases} \binom{n}{x} p^x.(1\text{-}p)^{n\text{-}x} & x=0,1,2,\ldots,n \\ 0 & d.d. \end{cases} \qquad E(x)=n.p, \quad Var(x)=n.p.(1-p)=n.p.q$$

**Negatif Binom Dağılımı**

$$P(X=x)=\begin{cases} \binom{x-1}{k-1} p^k.(1\text{-}p)^{x-k} & x=k,k+1,k+2,\ldots \\ 0 & d.d. \end{cases} \qquad E(x)=\frac{k}{p}, \quad Var(x)=\frac{k.(1-p)}{p^2}=\frac{k.q}{p^2}$$

**Geometrik Dağılım**

$$P(X=x)=\begin{cases} p.(1\text{-}p)^{x-1} & x=1,2,3,\ldots \\ 0 & d.\ d. \end{cases} \qquad E(x)=\frac{1}{p}, \quad Var(x)=\frac{(1-p)}{p^2}=\frac{q}{p^2}$$

**Hipergeometrik Dağılım**

$$P(X=x)=\begin{cases} \dfrac{\binom{M}{x}\binom{N-M}{n-x}}{\binom{N}{n}} & x=0,1,2,\ldots,n, \quad x\le M, \ n-x\le N-M \\ 0 & d.d. \end{cases}$$

$$E(x)=n\frac{M}{N}, \quad Var(x)=\left(\frac{N-n}{N-1}\right)n\left(\frac{M}{N}\right)\left(1-\frac{M}{N}\right)$$

**Poisson Dağılımı**

$$P(X=x)=\begin{cases} \dfrac{e^{-\lambda}\lambda^x}{x!} & x=0,1,2,\ldots \quad \lambda>0 \\ 0 & d.d. \end{cases} \qquad E(x)=\lambda, \quad Var(x)=\lambda$$

**Sürekli Uniform Dağılım**

$$f(x)=\begin{cases} \dfrac{1}{b-a} & a<x<b \\ 0 & \text{d.d.} \end{cases} \qquad E(x)=\frac{(a+b)}{2}, \qquad Var(x)=\frac{(b-a)^2}{12}$$

**Üstel Dağılım**

$$f(x)=\begin{cases} \dfrac{1}{\beta}e^{-\frac{x}{\beta}} & x>0 \\ 0 & \text{d.d.} \end{cases} \qquad E(x)=\beta, \quad Var(x)=\beta^2 \qquad P(X\ge a)=e^{-\frac{a}{\beta}}$$

**Normal Dağılım**

$$f(x)=\begin{cases}\dfrac{1}{\sigma\sqrt{2\pi}}\,e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2} & -\infty<x<\infty,\quad -\infty<\mu<\infty,\ \sigma^2>0\\ 0 & \text{d.d.}\end{cases}\qquad E(x)=\mu,\ Var(x)=\sigma^2$$

**Standart Normal Dağılım**

$$Z=\frac{x-\mu}{\sigma}$$

$$f(z)=\begin{cases}\dfrac{1}{\sqrt{2\pi}}\,e^{-\frac{1}{2}z^2} & -\infty<x<\infty,\quad \mu=0,\ \sigma^2=1\\ 0 & \text{d.d.}\end{cases}$$