Poisson $P(X=x)=\frac{(\lambda t)^x e^{-\lambda t}}{x!}, x=0,1,\ 2,\ldots+\infty; \quad \mu=\lambda t\ \&\ \sigma=\sqrt{\lambda t}$

Exponential $f(x)=\lambda e^{-\lambda x}, x>0; \quad where\ \ F(x)=1-e^{-\lambda x} \quad and\ \ \mu=\frac{1}{\lambda}\ \&\ \sigma=\frac{1}{\lambda}$

Weibull $f(x)=\frac{\beta}{\delta}\left(\frac{x}{\delta}\right)^{\beta-1} e^{-\left(\frac{x}{\delta}\right)^{\beta}},\ \ x>0;\ \ where\ \ F(x)=1-e^{-\left(\frac{x}{\delta}\right)^{\beta}} \mu=\delta\Gamma\left(1+\frac{1}{\beta}\right)$ &

$$\sigma^2=\delta^2\Gamma\left(1+\frac{2}{\beta}\right)-\mu^2$$

Interval Estimation $\quad Point\ Estimate \pm Ciritical\ Value * s.e(point\ estimate)$

Test Statistic $\quad \frac{Point\ Estimate-Hypothesized\ Value}{s.e(point\ estimate)}$

$P-value=P(\,Test\ Statistic\ is\ more\ extreme\ under\ the\ alternative\ than\ its\ observed\ vlue)$

Simple Linear Regression

$$s_{xy}=\sum(x-\bar{x})\,(y-\ \bar{y})=\sum xy-\frac{1}{n}\sum x\sum y$$

$$\widehat{\beta_1}=\frac{s_{xy}}{s_{xx}},\quad \widehat{\beta_0}=\bar{y}-\widehat{\beta_1}\bar{x}$$

$$s.e(\widehat{\beta_1})=\sqrt{\frac{\sigma^2}{s_{xx}}},\qquad s.e(\widehat{\beta_0})=\sqrt{\sigma^2\left(\frac{1}{n}+\frac{\bar{x}^2}{s_{xx}}\right)},$$

$$s.e(\widehat{\mu(x)})=\sqrt{\sigma^2\left(\frac{1}{n}+\frac{(x-\bar{x})^2}{s_{xx}}\right)},\qquad s.e(\widehat{y(x)})=\sqrt{\sigma^2\left(1+\frac{1}{n}+\frac{(x-\bar{x})^2}{s_{xx}}\right)}$$

SSR $=\widehat{\beta_1}s_{xy}$

$$r=\frac{s_{xy}}{\sqrt{s_{xx}s_{yy}}},\qquad \widehat{\sigma^2}=\frac{SSE}{n-p}$$

$$R^2=\frac{SSR}{SST},\qquad R^2_{adj}=1-\frac{SSE}{SST}\left(\frac{n-1}{n-p}\right),\qquad F=\frac{MSR}{MSE}$$

Multiple Linear Regression

$$\hat{\beta}=(X'X)^{-1}X'Y=CX'Y$$

$$S_e(\hat{\beta}_j)=\sqrt{\hat{\sigma}^2\ C_{jj}}$$

$$s.e(\hat{\mu}_{y|x_0})=\sqrt{\hat{\sigma}^2\left(\underline{x_0'}C\underline{x_0}\right)}\quad,\ \ s.e(\hat{y}_0)=\sqrt{\hat{\sigma}^2\left(1+x_0'C\underline{x_0}\right)}$$