1. GLRT
$$\Lambda = \frac{\max_{\theta \in \omega_0}[Lik(\theta)]}{\max_{\theta \in \Omega}[Lik(\theta)]}$$
2. ECDF
$$F_n(x) = \frac{1}{n}(\#x_i \leq x)$$
3. Survival Function
$$S(t) = P(T > t) = 1 - F(t)$$
4. Hazard function
$$h(t) = \frac{f(t)}{1 - F(t)}$$
$$h(t) = -\frac{d}{dt} \log S(t)$$
5. Sample variance
$$s^2 = \frac{1}{n-1} \sum_{i=1}^{n} (X_i - \bar{X})^2$$
6. Pooled sample variance and t statistic
$$s_p^2 = \frac{(n-1)s_X^2 + (m-1)s_Y^2}{m+n-2}$$
$$t = \frac{(\bar{X} - \bar{Y}) - (\mu_X - \mu_Y)}{s_p \sqrt{\frac{1}{n} + \frac{1}{m}}}$$
7. Degrees of freedom for t statistic for non-pooled variance
$$df = \frac{\left[(s_X^2/n) + (s_Y^2/m)\right]^2}{\frac{(s_X^2/n)^2}{n-1} + \frac{(s_Y^2/m)^2}{m-1}}$$
8. Estimates of β_0 and β_1
   (a) Main formulas
$$\hat{\beta}_0 = \frac{(\sum_{i=1}^n x_i^2)(\sum_{i=1}^n y_i) - (\sum_{i=1}^n x_i)(\sum_{i=1}^n x_i y_i)}{n\sum_{i=1}^n x_i^2 - (\sum_{i=1}^n x_i)^2}$$
$$\hat{\beta}_1 = \frac{n\sum_{i=1}^n x_i y_i - (\sum_{i=1}^n x_i)(\sum_{i=1}^n y_i)}{n\sum_{i=1}^n x_i^2 - (\sum_{i=1}^n x_i)^2}$$

(b) Formulas based on Problem 10. Ch. 14

$$\hat{\beta}_0 = \bar{y} - \hat{\beta}_1 \bar{x}$$

$$\hat{\beta}_1 = \frac{\sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y})}{\sum_{i=1}^{n}(x_i - \bar{x})^2} = \frac{r \times SD(y)}{SD(x)}$$

9. Variances of $\hat{\beta}_0$ and $\hat{\beta}_1$

$$Var(\hat{\beta}_0) = \frac{\sigma^2 \sum_{i=1}^{n} x_i^2}{n \sum_{i=1}^{n} x_i^2 - (\sum_{i=1}^{n} x_i)^2}$$

$$Var(\hat{\beta}_1) = \frac{n\sigma^2}{n \sum_{i=1}^{n} x_i^2 - (\sum_{i=1}^{n} x_i)^2}$$