tentative **Formulas for Biostat 513 Final Exam**

Relative risk:

$$RR = \frac{\pi_1}{\pi_2}$$

Odds ratio:

$$OR = \frac{\pi_1/(1-\pi_1)}{\pi_2/(1-\pi_2)}$$

The logistic function:

$$f(z) = \frac{\exp(z)}{1+\exp(z)}$$

Logistic regression and probability

$$\pi(X) = \frac{\exp(\beta_0 + \beta_1 X_1 + \ldots \beta_p X_p)}{1+\exp(\beta_0 + \beta_1 X_1 + \ldots \beta_p X_p)}$$

Likelihood ratio statistic:

$$LR = 2 \cdot (\log L_1 - \log L_2)$$

Hazard function:

$$h(t) = \lim_{\Delta \to 0} \frac{P[t \le T < t + \Delta \mid T \ge t]}{\Delta}$$

Kaplan-Meier:

$$\widehat{S}(t) = \prod_{t_i \le t} (1 - d_i/R_i)$$

Greenwood's formula:

$$\widehat{V}[\widehat{S}(t)] = \widehat{S}(t)^2 \sum_{t_i \le t} \frac{d_i}{R_i(R_i - 1)}$$

Testing for a single time:

$$Z = \frac{\widehat{S}_1(t) - \widehat{S}_2(t)}{\sqrt{\widehat{V}[\widehat{S}_1(t)] + \widehat{V}[\widehat{S}_2(t)]}}$$

Cumulative hazard:

$$H(t) = \int_0^t h(s)ds$$

Survival function:

$$S(t) = \exp[-H(t)\ ]$$

Proportional hazards model:

$$h(t, X) = h_0(t) \exp(\ \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_p X_p)$$

Survival function (assuming PH):

$$S(t, X) = [S_0(t)]^{\exp(\beta X)}$$