Plan for this exercise session

- ⋆ Show that the variance estimator for the two sample statistic $Z_1(t_0)$ is unbiased under H_0.
- ⋆ Find and "understand" $Z_1(t)$ and $V_{11}(t)$ as defined in Section 3.3.1 in ABG when using the Gehan-Breslow weight specified in Table 3.2 in ABG.

The derivation of the variance estimator

- ⋆ Using the predictable variation process $\langle Z_1 \rangle(t_0)$ we found

$$\text{Var}[Z_1(t_0)] = \text{E}\left[\int_0^{t_0} \frac{L^2(t)(Y_1(t) + Y_2(t))}{Y_1(t)Y_2(t)} \alpha(t)dt\right]$$

- ⋆ Estimating $\alpha(t)dt$ with $d\widehat{A}(t)$ (data from both groups) we get an estimator for $\text{Var}[Z_1(t_0)]$

$$V_{11}(t_0) = \int_0^{t_0} \frac{L^2(t)}{Y_1(t)Y_2(t)} dN_\bullet(t)$$

Some known properties for counting processes

- Doob-Meyer decomposition for a counting process

$$N(t) = \int_0^t \lambda(s)ds + M(s)$$

- For a counting process martingale we have

$$\langle M \rangle(t) = \int_0^t \lambda(s)ds$$

- For a sum of stochastic integrals we have

$$\left\langle \sum_{j=1}^{k} \int H_h dM_j \right\rangle(t) = \sum_{j=1}^{k} \int_0^t H_j^2(s) d\langle M_j \rangle(s)$$