Cox PH Seminar Question – Solution

(i) the baseline hazard h_0 is where all $z_i = 0$

so in this case that is a female patient where the existing treatment is applied immediately on diagnosis

(ii) here $z_1 = 6/12 = 0.5$, $z_2 = 1$, $z_3 = 1$

(a) therefore $h(t) = h_0 \exp[0.5x0.5 + 0.01x1 - 0.05x1] = h0 \exp[0.21]$

(b) the survival function is

$S(t) = \exp[-\int_0^t h(s)ds]$

from (a) above $S(t) = \exp[-\int_0^t h_0 \exp[0.21]ds]$

$= \exp[-\exp[0.21] \int_0^t h_0 \, ds]$

so $S(t) = \exp[-\int_0^t h_0 \, ds]^{\exp[0.21]}$

(iii) for this female patient, $z_1 = 0$, $z_2 = 1$, $z_3 = 0$

so $h(t) = h0 \exp[0.5x0 + 0.01x1 - 0.05x0] = h_0 \exp[0.01]$

we are given $S(5) = 0.75$

from (ii)(b) we know $S(5) = \exp[-\int_0^5 h_0 \, ds]^{\exp[0.01]}$

which means that $\exp[-\int_0^5 h_0 \, ds] = 0.75^{\exp[-0.01]}$

and then for the male patient

$S(5) = \exp[-\int_0^5 h_0 \, ds]^{\exp[0.21]} = (0.75^{\exp[-0.01]})^{\exp[0.21]}$

$S(5) = 0.7037$