

# EXAM C QUESTIONS OF THE WEEK

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## Week of July 3/06

A sample of loss amounts has observed losses at 50 , 100 , 200 , and higher loss amounts.

You are given the following:

- the product limit estimate of  $S(200)$  is .7500
- the Nelson-Aalen estimate of  $H(50)$  is .0500
- the Nelson-Aalen estimate of  $S(100)$  is .879020

Find the product limit estimate of  $S(200|X > 100)$  , where  $X$  represents the size of a loss.

**Solution can be found below.**

## Week of July 3/06 - Solution

We use the usual product-limit notation for the numbers of losses and the numbers at risk:

$y_i$	$s_i$	$r_i$
50	$s_1$	$r_1$
100	$s_2$	$r_2$
200	$s_3$	$r_3$

The product-limit estimate of  $S(200|X > 100)$  is  $1 - \frac{s_3}{r_3}$ .

$$S_n(200) = (1 - \frac{s_1}{r_1})(1 - \frac{s_2}{r_2})(1 - \frac{s_3}{r_3}) = .75 .$$

$$\hat{H}(50) = \frac{s_1}{r_1} = .05 .$$

$$\hat{S}(100) = e^{-\hat{H}(100)} = .879020 , \text{ where } \hat{H}(100) = \frac{s_1}{r_1} + \frac{s_2}{r_2} .$$

It follows that  $\hat{H}(100) = \frac{s_1}{r_1} + \frac{s_2}{r_2} = -\ln .879020 = .1289 = .05 + \frac{s_2}{r_2}$ , so that  $\frac{s_2}{r_2} = .0789$ .

$$\text{Then } S_n(200) = (1 - .05)(1 - .0789)(1 - \frac{s_3}{r_3}) = .75$$

$$\rightarrow S(200|X > 100) = 1 - \frac{s_3}{r_3} = \frac{.75}{(.95)(.9211)} = .857 .$$