old Q7

3) For discrete whole life insurance of J units, the premium is $P = \frac{JA_x}{\ddot{a}_x}$. Assume mortality follows the illustrative life table and $i = 0.06$.

a) Find the premium for a discrete whole life insurance of 1000 on (30).

$$P = 1000\,\frac{A_{30}}{\ddot{a}_{30}} = \frac{102.48}{15.8561} = 6.4631$$

b) Find the premium for a discrete whole life insurance of 1000 on (50).

$$P = 1000\,\frac{A_{50}}{\ddot{a}_{50}} = \frac{249.05}{13.2668} = 18.7724$$

c) Find the premium for a discrete whole life insurance of 1000 on (70).

$$P = 1000\,\frac{A_{70}}{\ddot{a}_{70}} = \frac{514.95}{8.5693} = 60.0924$$

d) Find the premium for a discrete whole life insurance of 100000 on (30).

$$P = 100\left(1000\,\frac{A_{30}}{\ddot{a}_{30}}\right) = 100(6.4631) = 646.31 \quad (\text{a})$$

e) Find the premium for a discrete whole life insurance of 100000 on (70).

$$P = 100\left(1000\,\frac{A_{70}}{\ddot{a}_{70}}\right) = 100(60.0924) = 6009.24 \quad (\text{c})$$

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2) Times (in weeks) until relapse below are for 12 patients with acute myelogeneous leukemia who reached a state of remission after chemotherapy. See Miller (1981, p. 49).
5, 5, 8, 8, 12, 16+, 23, 27, 30, 33, 43, 45
Compute the Kaplan Meier survival function $\hat{S}_K(t_i)$ by filling in the table below. Show what you multiply to find $\hat{S}_k(t_i)$. Then plot the function.

$n_i = n_i$

$\hat{S}_K(t_i) = \hat{S}_K(t_{i-1})\left(1 - \frac{d_i}{n_i}\right)$

$t_{(j)}$	γ_j	t_i	$n_i = \sum_{j=1}^{n} t_{(j)} \geq t_i$	d_i	$\hat{S}_K(t_i)$
		$t_0 = 0$			$\hat{S}_K(0) = 1$
5	1	5	12	2	$\hat{S}_K(5) = 1\left(1 - \frac{2}{12}\right) = .8333$
5	1				
8	1	8	10	2	$\hat{S}_K(8) = .8333\left(1 - \frac{2}{10}\right) = .6666$
8	1				
12	1	12	8	1	$\hat{S}_K(12) = .6666\left(1 - \frac{1}{8}\right) = .5833$
16	0				
23	1	23	6	1	$\hat{S}_K(23) = .5833\left(1 - \frac{1}{6}\right) = .4861$
27	1	27	5	1	$\hat{S}_K(27) = .4861\left(1 - \frac{1}{5}\right) = .3889$
30	1	30	4	1	$\hat{S}_K(30) = .3889\left(1 - \frac{1}{4}\right) = .2917$
33	1	33	3	1	$\hat{S}_K(33) = .2917\left(1 - \frac{1}{3}\right) = .1945$
43	1	43	2	1	$\hat{S}_K(43) = .1945\left(1 - \frac{1}{2}\right) = .09725$
45	1	45	1	1	$\hat{S}_K(45) = .09725\left(1 - \frac{1}{1}\right) = 0$

0 for good check unless last obs is censored