

Question #64

Answer: A

Year	bulb ages				# replaced
	0	1	2	3	
0	10000	0	0	0	-
1	1000	9000	0	0	1000
2	100+2700	900	6300	0	2800
3	280+270+3150				3700

The diagonals represent bulbs that don't burn out.

E.g., of the initial 10,000, $(10,000) (1-0.1) = 9000$ reach year 1.

$(9000) (1-0.3) = 6300$ of those reach year 2.

Replacement bulbs are new, so they start at age 0.

At the end of year 1, that's $(10,000) (0.1) = 1000$

At the end of 2, it's $(9000) (0.3) + (1000) (0.1) = 2700 + 100$

At the end of 3, it's $(2800) (0.1) + (900) (0.3) + (6300) (0.5) = 3700$

$$\begin{aligned}\text{Expected present value} &= \frac{1000}{1.05} + \frac{2800}{1.05^2} + \frac{3700}{1.05^3} \\ &= 6688\end{aligned}$$