Probability 2000

p2 q4
FHK

Model Answer

The record failure occurs after $\frac{5040}{7}$ = 720 hours

the third failure occurs after $\frac{5040}{6}$ = 840 hours

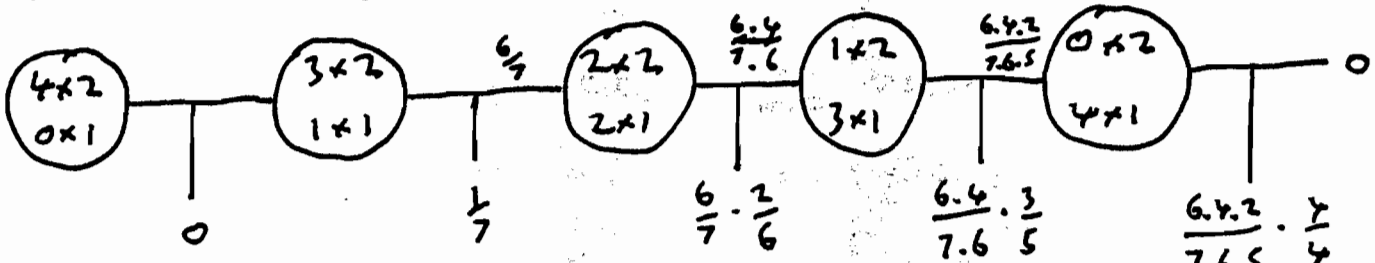
[2 marks]

At any moment the state of the room can be represented thus: $\begin{matrix} a\times 2 \\ b\times 1 \end{matrix}$

a = no. fittings with both neons working

b = no. fittings with one working

The following diagram shows the probabilities of going from state to state and dropping out when two neons go dud in any fitting:



Hence draw up a table:

r	0	1	2	3	4	5
$P(X=r)$	0	0	$\frac{1}{7}$	$\frac{3}{7}$	$\frac{12}{35}$	$\frac{8}{35}$
$rP(X=r)$	0	0	$\frac{3}{7}$	$\frac{6}{7}$	$\frac{48}{35}$	$\frac{40}{35}$

[12 Marks]

$E(X) = \sum rP(X=r) = \frac{0+0+10+30+48+40}{35} = \frac{128}{35}$ ---------- [4 Marks]

Rounding down $[E(X)] = 3$ and, from the question and from above, interval is $630 + 720 + 840 = 2190$ hours [2 marks]