7. [12]

Consider again the pipe-cleaning robot from the previous question. This robot and its control system have been modified. Firstly, the robot's belief representation has been changed to the following discrete representation:

0	1	2	3	4
p(x_t=0-10)	p(x_t=10-20)	p(x_t=20-30)	p(x_t=30-40)	p(x_t=40-50)

5	6	7	8	9
p(x_t=50-60)	p(x_t=60-70)	p(x_t=70-80)	p(x_t=80-90)	p(x_t=90-100)

You may ignore any issues pertaining to the coarseness of this representation in answering the following questions.

(a) [6] The robot cleans the pipe by travelling in turn to each end of the pipe. The motion model for the robot's forward travel is as follows:

$$p(x_t = i | x_{t-1} = j) = \begin{cases} 0.25 & \text{for } i = j \\ 0.75 & \text{for } i = j + 1 \\ 0 & \text{otherwise} \end{cases}$$

Assume that the robot is travelling forwards and that its former belief state $bel(x_{t-1})$ is as follows:

0	1	2	3	4	5	6	7	8	9
0	0	0.25	0.25	0	0	0.25	0	0.25	0

Compute $\overline{bel}(x_t)$ by filling in the table below

0	1	2	3	4	5	6	7	8	9
0									