1)

	S_t
$y_t = S_t$	a
$y_t = U[0,30]$	$1-a$

	$S_{t-1} < 30$	$S_{t-1} = 30$
$S_t = S_{t-1}+1$	p	0
$S_t = 0$	q	$1-x-y$
$S_t = U[0,30]$	$1-p-q$	y
$S_t = S_{t-1}$	0	x

$$S_0 \longrightarrow S_1 \longrightarrow S_2 \longrightarrow \cdots \longrightarrow S_N$$
$$\qquad\quad \downarrow \qquad\quad \downarrow \qquad\qquad\qquad \downarrow$$
$$\qquad\quad y_1 \qquad\quad y_2 \qquad\qquad\qquad y_N$$
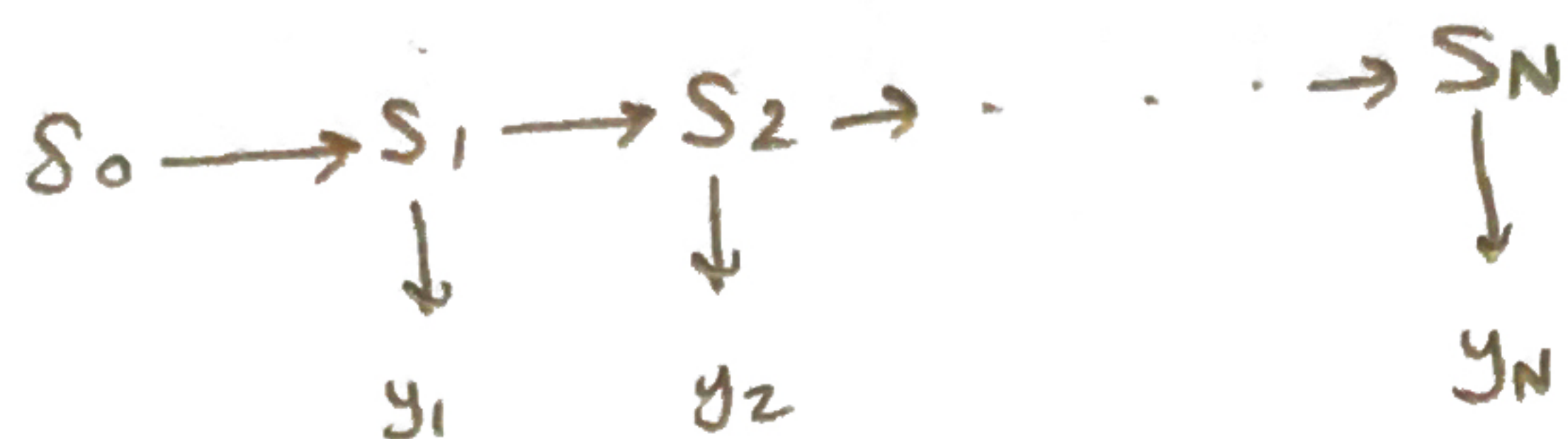
2)

	$S_{t-1}-S_{t-2}=1$	$S_{t-1}-S_{t-2}=-1$	$S_{t-1}-S_{t-2}=1$ & $S_{t-1}=30$	$S_{t-1}-S_{t-2}=-1$ & $S_{t-1}=0$
$S_t = S_{t-1}+1$	p	$1-p$	0	$1-p$
$S_t = S_{t-1}-1$	$1-p$	p	$1-p$	0
$S_t=30$ & $S_{t-1}=0$	0	0	0	p
$S_t=0$ & $S_{t-1}=30$	0	0	p	0

$$S_0 \longrightarrow S_1 \longrightarrow S_2 \longrightarrow \longrightarrow S_N$$
$$\qquad\quad \downarrow \qquad\quad \downarrow \qquad\qquad \downarrow$$
$$\qquad\quad y_1 \qquad\quad y_2 \qquad\qquad y_N$$
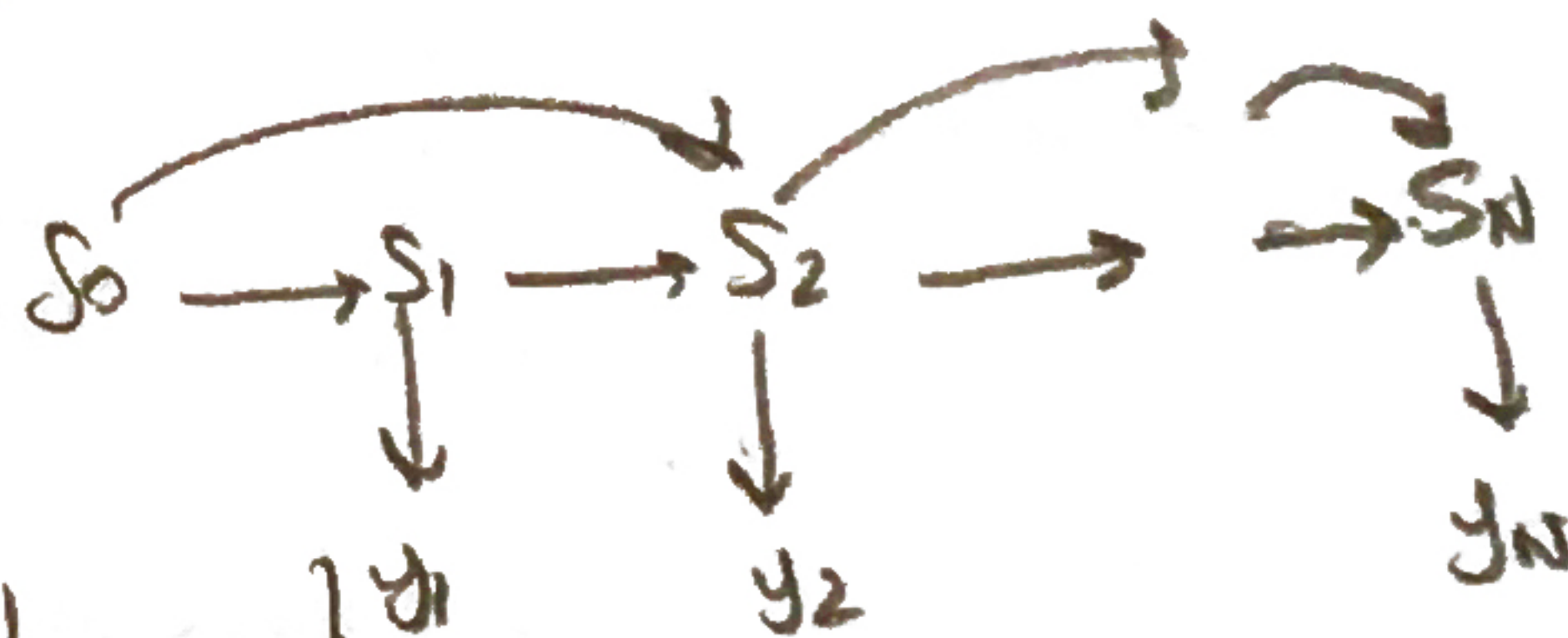
	S_t
$y_t = S_t$	1

4)

	$x_{t-1}=a$	$x_{t-1}=b$	$x_{t-1}=c$	$x_{t-1}=d$	$x_{t-1}=e$
$x_t = a$	$1-p$	$1-p$	$1-p$	$1-p$	$1-p$
$x_t = b$	p	0	0	0	0
$x_t = c$	0	p	0	0	0
$x_t = d$	0	0	p	0	0
$x_t = e$	0	0	0	p	p

$$x_0 \longrightarrow x_1 \longrightarrow x_2 \longrightarrow x_3 \longrightarrow x_4 \longrightarrow \cdots$$