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Convert the following regular expressions to equivalent NFAs. (In each case, break down the given regex into manageable pieces such that you can directly construct a DFA/NFA for each "piece". Then combine the pieces using the procedures we discussed in class.)

(a)

$$r = (0|1)^*000(0|1)^*$$

Let $r_0 = (0|1)^*$, $r_1 = 000$

Let NFA M_0 recognise $L(r_0) = L(M_0)$, M_0 has:

- state $P = \{p_0\}$
- start state $p_0 \in P$
- accept state $A = \{p_0\}$
- transition function δ :

Input State	Letter	Output State
p_0	0	p_0
p_0	1	p_0

Let NFA M_1 recognise $L(r_1) = L(M_1)$, M_1 has:

- state $Q = \{q_0, q_1, q_2, q_3\}$
- start state $q_0 \in Q$
- accept state $A = \{q_3\}$
- transition function δ :

Input State	Letter	Output State
q_0	0	q_1
q_1	0	q_2
q_2	0	q_3

Combining the 3 parts: Let NFA M recognise $L(r) = L(M)$, M has:

- states $Q = \{p_0, q_0, q_1, q_2, q_3, r_0\}$
- start state $p_0 \in Q$
- accept state $A = \{r_0\}$
- transition function δ :

Input State	Letter	Output State
p_0	0	p_0

Input State	Letter	Output State
p_0	1	p_0
p_0	ϵ	q_0
q_0	0	q_1
q_1	0	q_2
q_2	0	q_3
q_0	ϵ	r_0
r_0	0	r_0
r_0	1	r_0