Describe a non-deterministic bottom-up parser for the following grammar, where S is the start state:

1. $S \to AS$
2. $S \to b$
3. $A \to a$

There are many solutions. Here is one:

1. The stack alphabet is $\{a, b, S, A\}$.
2. There are two states, which we call q_0 and q_1.
3. The start state is q_0.
4. The initial stack is empty.
5. The machine never pops more than one symbol.
6. The machine accepts by empty stack.
7. The transition table is as follows:

old state	pop	read	push	new state	output
q_0	ϵ	a	a	q_0	ϵ
q_0	ϵ	b	b	q_0	ϵ
q_0	a	ϵ	A	q_0	3
q_0	b	ϵ	S	q_0	2
q_0	S	ϵ	ϵ	q_1	ϵ
q_1	A	ϵ	S	q_0	1
q_0	S	ϵ	ϵ	q_0	ϵ

Note that the state q_1 is used only to "remember" that the machine is in the middle of reducing using the rule $S \to AS$.