Name ___Solutions_____ Discrete II, Quiz 5

Consider the finite state machine (I, O, S, f, g, σ) given as defined below.
$I = \{00, 01, 02, 10, 11, 12, 20, 21, 22\}$
$O = \{0, 1, 2\}$
$S = \{0,1\}$
$\sigma = 0$
$f: S \times I \to S$ is given by:

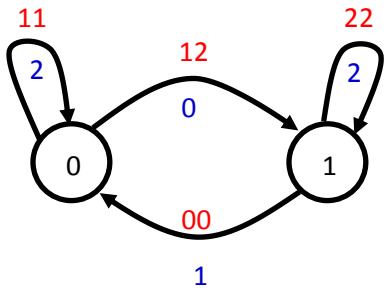
$S\backslash I$	00	01	02	10	11	12	20	21	22
0	0	0	0	0	0	1	0	1	1
1	0	0	1	0	1	1	1	1	1

$g: S \times I \to O$ is given by:

$S\backslash I$	00	01	02	10	11	12	20	21	22
0	0	1	2	1	2	0	2	0	1
1	1	2	0	2	0	1	0	1	2

1) Given the following inputs, find the corresponding output (4 points). At the same time illustrate this on a state diagram (4 points). Just one state diagram with only the parts relevant to this problem please.

Input "11"
Output: 2
(No state change)
Input "12"
Output: 0
(State change to 1)
Input "22"
Output: 2
(No state change)
Input "00"
Output: 1
(State change to 0)



2) Describe in simple English what this finite state machine does or models. You may answer either in general, or specifically with regards to the four inputs above.
This is a trinary adder. Specifically, it is a serial adder for base 3 arithmetic. In the example above it computed the following addition problem:

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 0211
+0221
 1202
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