Solution to Homework Problem 18

Homework Problem 18. Use the general algorithm to transform a finite automaton from Problem 3 into a Turing machine. Show step-by-step, on an example of a word ABF, how this word will be processed by your Turing machine.

Automaton from Problem 3: reminder. This automaton has two states: g and p; g is the starting state and the final state. The only three symbols are A, B, and F. From g, A and B lead back to g, and F leads to p. From p, any symbol leads back to p.

Solution. Here are the rules for the Turing machine:

start, $-$ → R, g
g, A → R, g
g, B → R, g
g, F → R, p
p, A → R, p
p, B → R, p
p, F → R, p
p, $-$ → reject
g, $-$ → accept

Tracing.

$\underline{-}$	A	B	F	$-$	...	start
$-$	$\underline{A}$	B	F	$-$	...	g
$-$	A	$\underline{B}$	F	$-$	...	g
$-$	A	B	$\underline{F}$	$-$	...	g
$-$	A	B	F	$\underline{-}$	...	p
$-$	A	B	F	$\underline{-}$	...	reject