Theory of Computation, CSCI 438 spring 2022
Multitape Turing Machines, pg. 176-178, March 27th

2-tape Turing Machine: Like an ordinary Turing Machine but has two tapes, each with its own read/write head. The input is on tape 1 followed by blanks and tape 2 is completely blank. The read/write heads are positioned in the first positions of each tape. For flexibility, say that the read/write heads can move separately, that is allow stays.

$M=(Q,\Sigma, \Gamma_1,\Gamma_2,\delta,q_0,q_{accept}, q_{reject})$

$\delta:Q\times\Gamma_1\times\Gamma_2 \rightarrow Q\times\Gamma_1\times\Gamma_2\times\{L,R,S\}\times\{L,R,S\})$

Multitape Turing Machine: Like an ordinary Turing Machine but has k tapes so k read/write heads. Say initially, input on tape 1 is as usual and the other tapes are blank. Formally define the machine:

$M=(Q,\Sigma,\Gamma,\delta,q_0,q_{accept}, q_{reject})$

$\delta:Q\times\Gamma^k\rightarrow Q\times\Gamma^k\times\{L,R,S\}^k$

$\delta:Q\times\Gamma\times\Gamma\times\ldots\times\Gamma \rightarrow Q\times\Gamma\times\Gamma\times\ldots\times\Gamma,\{L,R,S\}\times\{L,R,S\}\times\ldots\times\{L,R,S\}$

k times k times k times