Solution to Problem 9

Problem. Design a Turing machine that computes a function $f(n)$ which is equal:

- to $n-2$ when $n > 2$ and
- to 0 if not.

Assume that the input n is given in unary code.

Solution. We go right until we see the first blank. Then, we go back and delete the last two 1s.

- start, – $\to$ R, moving
- moving, 1 $\to$ R
- moving, – $\to$ L, erase1st
- erase1st, 1 $\to$ –, L, erase2nd
- erase1st, – $\to$ halt
- erase2nd, 1 $\to$ –, L, back
- erase2nd, – $\to$ halt
- back, 1 $\to$ L
- back, – $\to$ halt