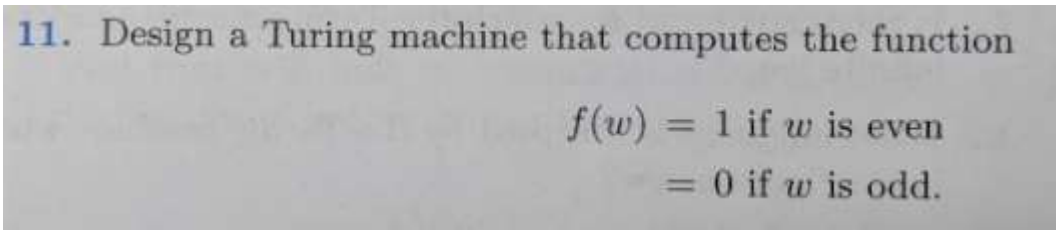
Homework #6 Teory of Computation(COSE215)

Due: Monday, June 10, 2019, 11:59 PM (KST)

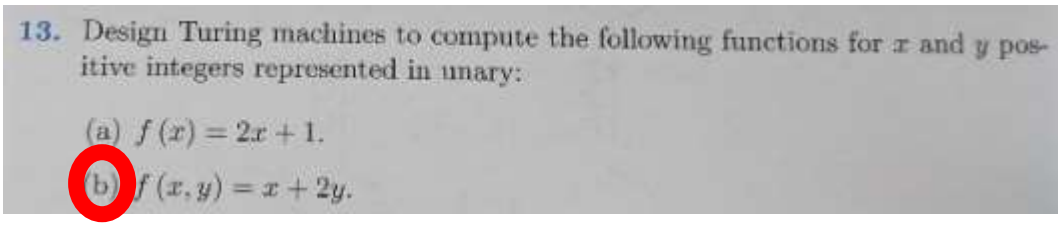
1. **Do Exercise 11 of Section 9.1 at page 248.**



11. Design a Turing machine that computes the function

$$f(w) = 1 \text{ if } w \text{ is even}$$
$$= 0 \text{ if } w \text{ is odd.}$$

2. **Do Exercise 13(b) of Section 9.1 at page 248.**

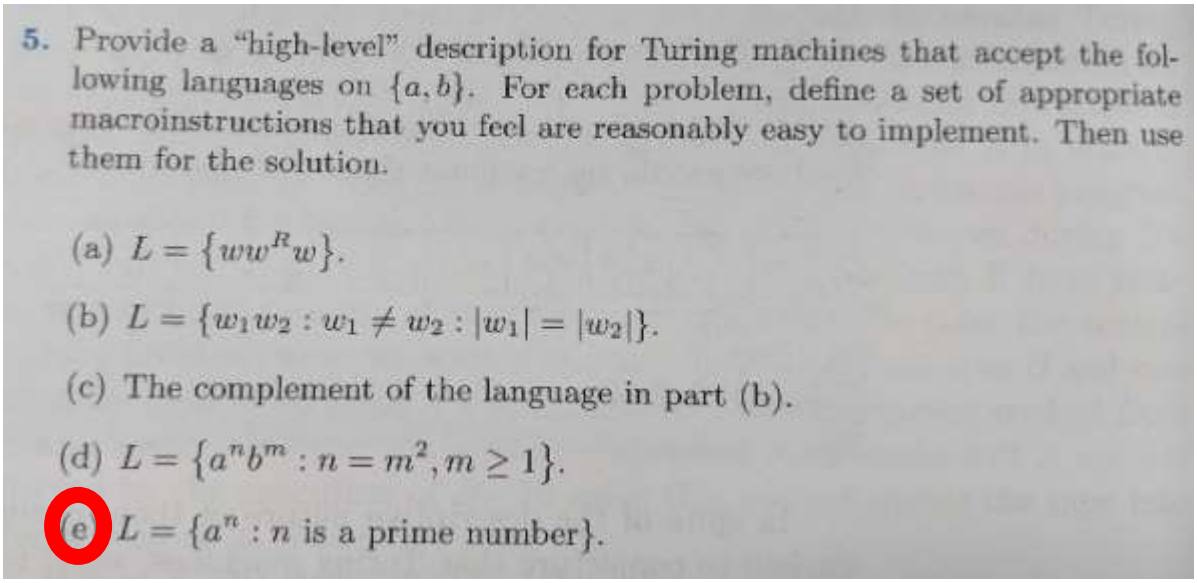


13. Design Turing machines to compute the following functions for x and y positive integers represented in unary:

(a) $f(x) = 2x + 1$.

(b) $f(x, y) = x + 2y$.

3. **Do Exercise 5(e) of Section 9.2 at page 254.**



5. Provide a "high-level" description for Turing machines that accept the following languages on $\{a, b\}$. For each problem, define a set of appropriate macroinstructions that you feel are reasonably easy to implement. Then use them for the solution.

(a) $L = \{ww^R w\}$.

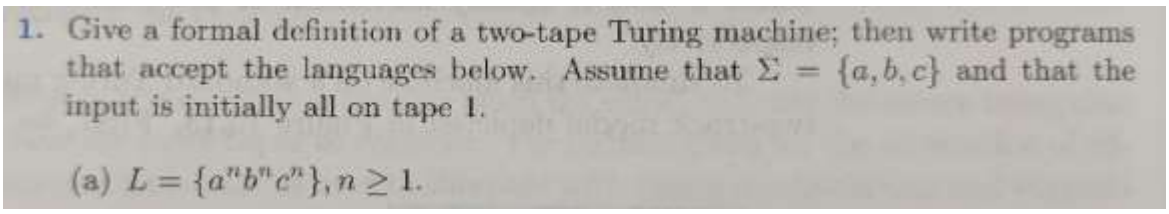
(b) $L = \{w_1 w_2 : w_1 \neq w_2 : |w_1| = |w_2|\}$.

(c) The complement of the language in part (b).

(d) $L = \{a^n b^m : n = m^2, m \geq 1\}$.

(e) $L = \{a^n : n \text{ is a prime number}\}$.

4. **Do Exercise 1(a) of Section 10.2 at page 272.**



1. Give a formal definition of a two-tape Turing machine; then write programs that accept the languages below. Assume that $\Sigma = \{a, b, c\}$ and that the input is initially all on tape 1.

(a) $L = \{a^n b^n c^n\}, n \geq 1$.