

You have to use the designated spaces for your answers. No extra pages will be provided.

Problem 1: Designing Context-Free Grammar (10 points)

Let $\Sigma = \{0, 1, 2\}$. Consider the following language over Σ .

$$L = \{0^i 1^j 2^k \mid i, j, k \geq 0, k + 1 = i + j\}$$

- (a) Write down all the five-letter strings in L . (2 points)
- (b) Give a context-free grammar for L . (8 points)
(**Hint:** First handle the case where $k = i + j$, and then think of the ways you can add one extra letter.)