

Test 3 Marking Scheme — Questions 3b, 4 and 5

- 3b [1] State Rice's Theorem
[1] State that L_{ne} is defined by a non-trivial property
[3] Rice's Theorem in this context; show *why* the property is non-trivial
- 4a [2] L is recursive \Rightarrow both L and \bar{L} are RE
[3] L and \bar{L} are RE $\Rightarrow L$ is recursive
[2] State that M halts on every input
[1] Design M correctly — state that you simulate TM_L and $TM_{\bar{L}}$ *simultaneously*
- 4b Deductions for various mistakes
- 5 [2] Case 1: all A -strings are longer than B -strings, and vice-versa
[2] Case 2: any corresponding pair has the same length
[2] Case 3: one A -string longer than its corresponding B -string, one B -string longer than its A -string.
[3] Details, mathematical justification
[1] Conclusion