

(H) Thorny Stems

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| 1. If a word ends in ies , then replace ies with y . | Exception: series |
| 2. If a word ends in ss , then replace ss with ss . | No exceptions |
| 3. If a word ends in ives , then replace ves with fe . | Exception: hives |
| 4. If a word ends in ves , then replace ves with f . | Exception: caves |
| 5. If a word ends in oes , then replace oes with o . | Exception: floes |
| 6. If a word ends in s , then replace s with _ . | Exception: guesses |
| 7. If a word ends in ing , then replace ing with _ . | Exception: closing |
| 8. If a word ends in ied , then replace ied with y . | Exception: lied |
| 9. If a word ends in ed , then replace ed with _ . | Exception: posed |
| 10. Otherwise the word is its own stem. | Exception: formulae |

The order of rules is somewhat flexible, and the only requirements are as follows:

- Rules 1–5 are before Rule 6.
- Rule 3 is before Rule 4.
- Rule 8 is before Rule 9.

We may find multiple exceptions to most rules; some examples are as follows:

- Rule 5: toes
- Rule 6: bus
- Rule 7: ring
- Rule 9: bed

Notes and common mistakes

- The problem statement does not ask to include exception for the last (“otherwise”) rule, and thus the grading has not accounted for this exception.
- The word “wives” has a unique pattern, which requires its own rule (Rule 3).
- We need Rule 2 so that Rule 6 does not remove s from words like “moss.”
- Some contestants have listed more specific cases after more general cases, such as Rule 8 after Rule 9. Since we use the first matching rule, this ordering leads to ignoring the appropriate specific rule.
- An additional rule for the words ending in **es** is not required in the given rule set, since these words match either Rules 3–5 or Rule 6.
- A word is an exception only if the entire rule set gives a wrong result for this word. For example, “knives” is not an exception to Rule 4, because it matches Rule 3, which is before Rule 4.
- The problem statement does not allow the use of wildcards or other complex specifications; for example, we cannot collapse Rules 1 and 8 to a single **ie*** rule, and we also cannot define a single rule for the words ending in **<consonant>ves**.
- Some contestants have indicated that a word like “princess” may be stemmed to “prince”, but it is a different sort of word change.
- Several contestants have solved a different problem; specifically, they have given a list of rules and exceptions that together cover the given word list, and thus they have included words from the given list as exceptions. While this problem is also interesting, we issued a clarification that the competition problem was different.