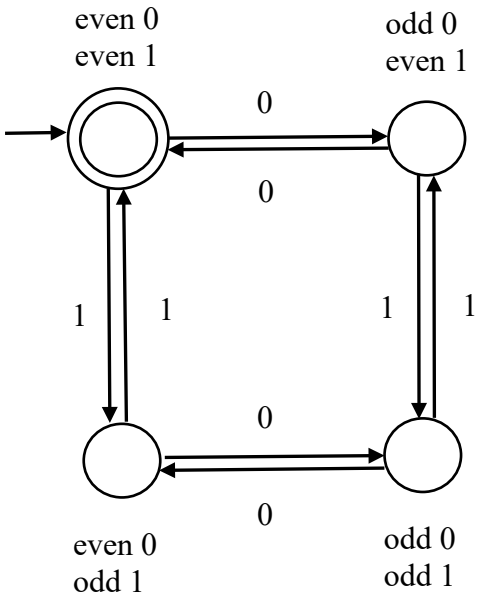
CS4248
AY 2022/23 Semester 1
Tutorial 1 Solutions

1. The portion of string *s* that is matched by *rexpr* is underlined (output of `re.search`), and the span (Python start and end index) returned by `re.search` is given below.

| *rexpr* | *s* | span |
|---|---|---|
| ha* | hahaha | (0, 2) |
| ha* | haaa | (0, 4) |
| ha* | hihahaha | (0, 1) |
| (ha)* | hahaha | (0, 6) |
| (ha)* | haaa | (0, 2) |
| (ha)* | hihahaha | (0, 0) |

2.
.*[aeiou].*ing$

3.



4. Proof:

$B = B \cap \Omega = B \cap (A_1 \cup \cdots \cup A_n) = (B \cap A_1) \cup \cdots \cup (B \cap A_n)$

For any $i, j$, since $A_i$ and $A_j$ are disjoint, $B \cap A_i$ and $B \cap A_j$ are also disjoint. Hence,

$P(B) = P(B \cap A_1) + \cdots + P(B \cap A_n)$

By Bayes' Theorem:

$$P(A_i|B) = \frac{P(B|A_i) \cdot P(A_i)}{P(B)}$$

Hence,

$$P(A_i|B) = \frac{P(B|A_i) \cdot P(A_i)}{P(B \cap A_1) + \cdots + P(B \cap A_n)} = \frac{P(B|A_i) \cdot P(A_i)}{\sum_{j=1}^{n} P(B \cap A_j)} = \frac{P(B|A_i) \cdot P(A_i)}{\sum_{j=1}^{n} P(B|A_j) \cdot P(A_j)}$$