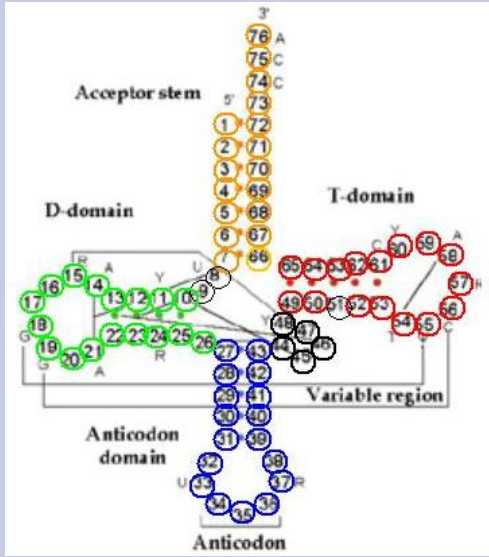
RNA Secondary Structure

- **RNA is a sequence of nucleotides**
  - Adenine, Guanine, Cytosine, Uracil

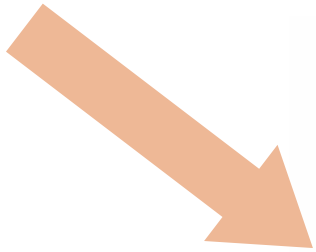
GCGGAUUUAGCUCAGUUGG
GAGAGCGCCAGACUGAAGA
UCUGGAGGUCCUGUGUUCG
AUCCACAGAAUUCGCACCA

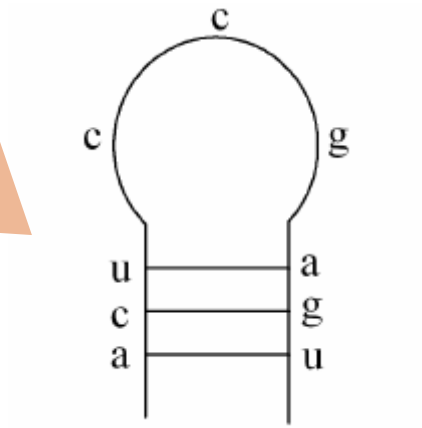
- **Adenine pairs with Uracil, and Cytosine pairs with Guanine by a hydrogen bond**

- **The paring makes the RNA sequence fold upon itself, resulting a secondary structure of RNA**



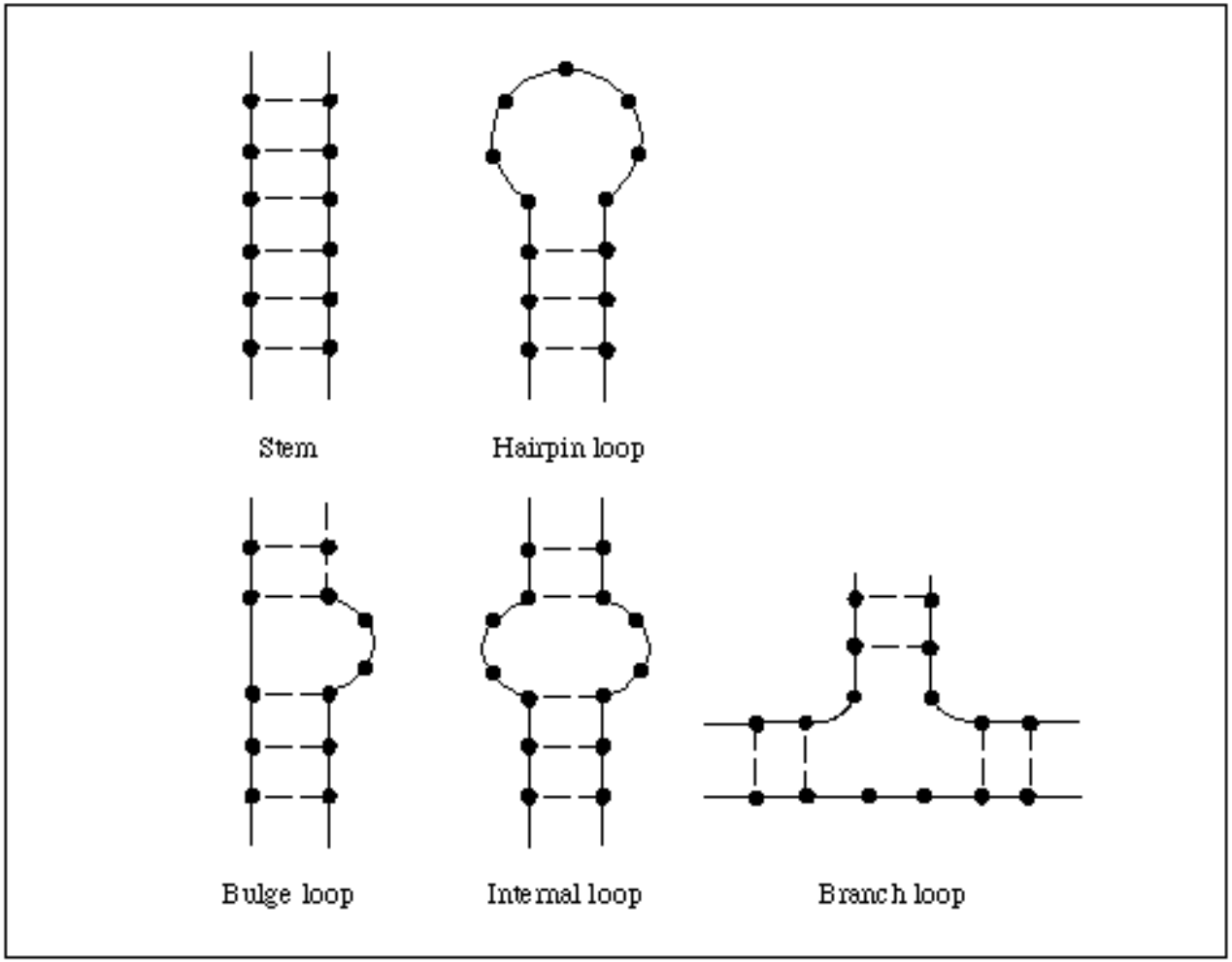
RNA Secondary Structure





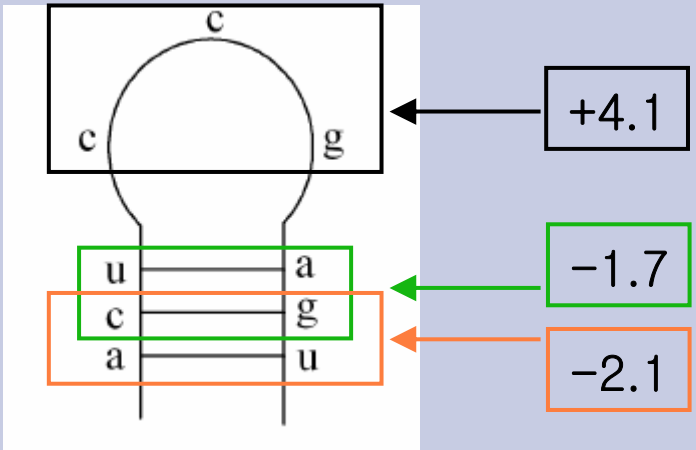
(((. . .)))

Various Substructures



Secondary Structure and Energy

- Two pairs of nucleotides reduce the total free energy of RNA molecule by stacking on each other
- Loops increase the total free energy of RNA molecule



- Biologists wants to predict the secondary structure with minimum free energy

HW3. RNA Secondary Structure Prediction

- **Write a Prolog program that**
  - given a sequence of RNA,
  - predicts the secondary structure with minimum free energy
- **The program should print**
  - The predicted structure
    - with ‘(‘, ‘.’, and ‘)’
  - Free energy of the structure

- **Efficiency and correctness will be the measure**
- **Detailed energy data will be distributed**

- **Until 4/26 3:30pm**