COS 341, December 1, 1999
Due December 15, 1999

Homework Set 7

IMPORTANT No late homework accepted for this homework set.

Reading Assignments Read Chapter 13.

Written Assignments

Do Exercises 9, 12, 20 and 40 in Chapter 11.8.

Do Exercises 5, 13, 18, 30 and 42 in Chapter 13.6.

Remark In your solution to Exercise 5, be sure to give a rigorous justification of your claim.

Special Problem 1 (counted as 2 exercises) An ancient DNA fragment of a dinosaur has just been found. It is known that this critical fragment σ contains some critical information. If the string $ACGAACT$ appears in $\bar{\sigma}$, then it can fly; if the string $CTCACG$ appears in $\bar{\sigma}$, then it is vegetarian; if the string $TGACCT$ appears in $\bar{\sigma}$, then it is a timid dinosaur.

The fragment has length 17, and you have subjected it to the hybridization procedure with $\ell = 4$. The spectrum S you get consists of the strings $ACGA, AACT, ACTC, ACGT, GACT, CTCA, CGAA, CTGA, TGAC$, $GAAC, GACG, ACTG, CACG, TCAC$.

Questions: What is G_S? Find all the σ which has S as its spectrum. What kind of dinosaurs can you infer?

Special Problem 2 (counted as 2 exercises) Let $G = (V, E)$ where $V = \{v_1, v_2, v_3, v_4, v_5, w_1, w_2, w_3\}$ and E consists of the edges $\{v_i, v_j\}$, $1 \leq i, j \leq 5$ and $\{v_i, w_j\}, 1 \leq i \leq 3, 1 \leq j \leq 3$. Answer each of the following questions; justify your answers.

(a) What is $\omega(G)$, the size of the largest clique?
(b) What is $\alpha(G)$, the size of the largest independent set?
(c) What is $\chi(G)$, the chromatic number?
(d) Is G a planar graph?
(e) Is G an Eulerian graph?
(f) Does G contain a Hamiltonian cycle?