922 M0520 Compuation Theory and Algorithms **National Taiwan University**
Fall 2004 **Department of CSIE**

Homework 4

December 22, 2004 Due date: January 5, 2005

1. (10%) Show the equivalent CLIQUE problem of the 3SAT problem for $\phi = (\overline{x_1} \vee x_2 \vee x_3) \wedge (x_1 \vee \overline{x_2} \vee \overline{x_3}) \wedge (x_1 \vee x_2 \vee x_3)$
2. (20%) Show the equivalent SUBSET-SUM problem of the VERTEX-COVER problem for the graph shown in Figure 1.
3. (10%) Show the equivalent SET-PARTITION problem of the SUBSET-SUM problem for $S = \{1, 2, 3, 4, 5\}$ and $t = 11$.
4. (10%) Show the equivalent UHAMPATH problem of the HAMPATH problem for the graph shown in Figure 2.
5. (10%) Show the equivalent TSP problem of the UHAMCYCLE problem for the graph shown in Figure 1.
6. (10%) Use APPROX-VERTEX-COVER to find the approximate optimum for the vertex-cover problem of the graph in Figure 1. Show the process of your computation.
7. (10%) Use GREEDY-SET-COVER to find the approximate optimum for the vertex-cover problem of $X = \{x_1, x_2, \cdots, x_{12}\}$, $F = \{S_1, S_2, S_3, S_4, S_5, S_6\}, S_1 = \{x_1, x_4, x_7, x_{10}\}, S_2 = \{x_1, x_2, x_5, x_8, x_{11}\}, S_3 = \{x_3, x_6, x_9, x_{12}\}, S_4 = \{x_2, x_3, x_5, x_6\}, S_5 = \{x_4, x_5, x_6, x_7, x_8, x_9\}$ and $S_6 = \{x_{11}, x_{12}\}$. Show the process of your computation.
8. (20%) Use APPROX-SUBSET-SUM with $\epsilon = 0.4$ to find the approximate optimum for the subset-sum problem of $S = \{104, 102, 206, 108\}$ and $t = 315$. Show the process of your computation.

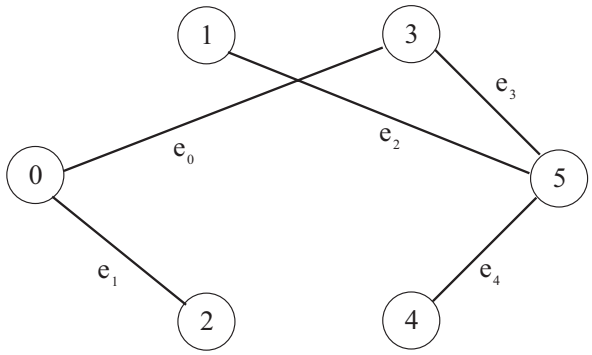

Figure 1

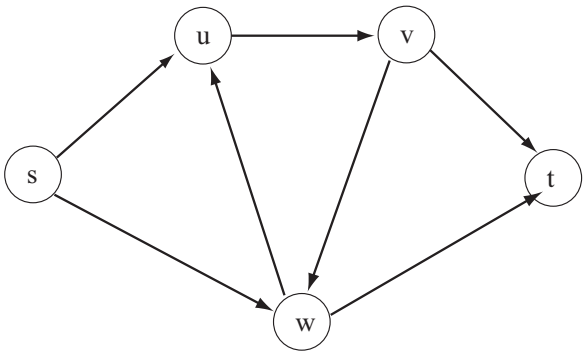

Figure 2