

## Exercise #11

(範圍: Graph Theory)

1. How many different Hamiltonian cycles are there in  $K_5$ ? (10%)
2. Prove the theorem on page 68 of lecture notes. (15%)
3. P. 564: 22. (40%)
4. Given a graph  $G=(V, E)$ , how to determine 0/1 matrices  $B, B^2, B^3, \dots, B^{|V|-1}$  so that for  $1 \leq k \leq |V|-1$ ,  $B^k(i, j) = 1$  if and only if there exists an  $i$ -to- $j$  walk of length  $\leq k$  in  $G$ ? (15%)
5. Given a graph  $G=(V, E)$ , how to determine matrices  $C, C^2, C^3, \dots, C^{|V|-1}$  so that for  $1 \leq k \leq |V|-1$ ,  $C^k(i, j)$  tells the number of different  $i$ -to- $j$  walks of length  $k$  in  $G$ ? (20%)