

國立臺灣科技大學

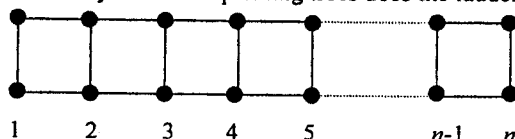
九十一學年度碩士班招生考試試題

系所組別：資訊管理系甲組

科目：離散數學

總分100分

1. In a graph, the *degree* of a vertex is the number of vertices adjacent to it. A vertex is an *odd vertex* if its degree is an odd number. Prove that every graph contains an even number of odd vertices.(10%)
2. Suppose that n straight lines are drawn in a plane so that no two lines are parallel and no more than two lines intersect at any point. Let S_n be the number of different regions determined by the lines. Find a recurrence relation and initial conditions for S_n when $n \geq 1$.(10%)
3. A vertex x is called an *articulation point* of a connected graph G when the deletion of x and the edges incident on x creates a graph that is not connected. If the depth-first search starts at vertex x , prove that x is an articulation point of G if and only if x has more than one child in the depth-first search spanning tree.(15%)
4. In a graph a *Hamiltonian cycle* is a cycle that includes each vertex. Suppose G is a graph with n vertex, where $n > 2$. Prove that if each vertex has degree at least $n/2$, then G has a Hamiltonian cycle.(15%)
5. Solve the recurrence relation $a_n - 4a_{n-1} + 4a_{n-2} = (n+1)2^n$, given that $a_0 = 1$ and $a_1 = \frac{19}{3}$. (14%)
6. How many different spanning trees does the ladder graph in below figure have? (13%)



7. Find a deterministic finite state machine that recognizes the set of string of 0s and 1s in each of which the number of 0s is odd and the number of 1s is a multiple of 3. (13%)
8. Describe the definition of "GROUP" and give an example. (10%)

