

Discrete Mathematics
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Final Exam
25-1-2003

1. Prove by induction for all n positive,

$$2 + 4 + 6 + \dots + 2n = n(n + 1)$$

2. Find the formula for the recurrence relation given by

$$a_0 = 1$$

$$a_1 = 2$$

$$a_n = a_{(n-1)} + 12 a_{(n-2)}$$

3. Let $A = \{1, 3, 5, 6, 30, 45\}$ and $R = \{(a, b) | a \text{ divides } b\}$. Find the elements of R and draw its Hasse diagram.

4. Draw the complete graph with 6 vertices and then find its total degree.

5. Draw any graph with 5 vertices and 8 edges which is an Euler circuit.

6. Use a binary tree to represent $(A+B) \times (C-D) - \{E + (F \times G)\}$.

7. Write the output of the inorder traversal on the following tree.

$$(1, 1, 1, 1), (1, 1, 2), (1, 2, 1), (1, 2, 2, 1), (1, 2, 2, 2), (1, 2, 3)$$