

Chapter 1: The Foundations: Logic and Proofs

Section	Required Exercises
1.1 Propositional Logic	2,3,8(a,d,g),11(a,c,e),17,28,29(a,c),31(c,e), 35(e),40.
1.3 Propositional Equivalences	1(a),3(a),7,9(c),10(c),11,12,14,16,19.
1.4 Predicates and Quantifiers	1,5,7,11,14,15,19.
1.6 Rules of Inference	1,2,and The sheet below
1.7 Introduction to Proofs	1,3,6,9,11,15,16,17,26,31.
1.8 Proof Methods and Strategy	1,3,6,9,14,19,29,34.

Section 1.6

Are the following arguments valid or invalid?

$ \begin{array}{l} p \vee r \\ r \rightarrow q \\ s \vee \neg q \\ \neg s \\ \hline \therefore p \end{array} $	$ \begin{array}{l} p \rightarrow q \\ \neg q \\ p \vee s \\ \hline \therefore s \end{array} $
$ \begin{array}{l} (q \vee r) \rightarrow p \\ \neg p \\ s \rightarrow r \\ \hline \therefore \neg s \end{array} $	$ \begin{array}{l} p \rightarrow q \\ \neg p \rightarrow r \\ r \rightarrow s \\ \hline \therefore \neg q \rightarrow s \end{array} $
$ \begin{array}{l} \neg p \rightarrow (p \vee r) \\ \neg q \rightarrow (\neg p \wedge s) \\ s \rightarrow q \vee r \\ \hline \therefore q \end{array} $	$ \begin{array}{l} p \rightarrow (q \rightarrow r) \\ r \rightarrow \neg u \\ \neg s \rightarrow u \\ \hline \therefore q \rightarrow (p \rightarrow u) \end{array} $

Chapter 2: Basic Structures: Sets, Functions, Sequences, Sums and Matrices

2.1 Sets	1,2,3,5,7,8,10,19,27(a)
2.2 Set Operations	4,14,25,28

Chapter 5: Induction and Recursion

5-1 Mathematical Induction	4-5-6-8-9-12-18-20-28-31-32-38-39-43
5-2 Strong Induction and Well-Ordering	<p>Q1: Let $\{a_n\}$ be a sequence of integers defined inductively as: $a_1 = 1, a_2 = 5, a_{n+1} = 2a_n + 3a_{n-1}$ for all $n \geq 2$. Prove that $3^n \leq a_{n+1} \leq 2(3^n)$ for all $n \geq 1$.</p> <p>Q2: Let $\{a_n\}$ be a sequence of integers defined inductively as: $a_1 = a_2 = a_3 = 1, a_{n+2} = a_{n+1} + a_n + a_{n-1}$ for all $n \geq 2$. Prove that a_n is an odd number for all $n \geq 1$.</p> <p>Q3: Let $\{a_n\}$ be a sequence of integers defined inductively as: $a_0 = 1, a_{n+1} = a_n + 3^n$ for all $n \geq 0$. Prove that $a_n = \frac{1}{2}(3^n + 1)$ for all $n \geq 0$.</p>

Chapter 9: Relations

9.1 Relations and their Properties	1,3,6,10,11,18,26,30,32,34(a,d,e)- 36(d,e,h) ,41 ,50 ,51,52,53,56.
9.3 Representing Relations	18,22,24,26,27, 31,32.
9.4 Closures and Relations	1,2,4,5,6,8,9,19,22,24,29.
9.5 Equivalence Relations	1,3,9,16,21,22,23,26,28,36,40(a),42,46,48(a),55, 56(a,b).
9.6 Partial Ordering	1,6,9,10,11,14,20,22.

Chapter10: Graphs

10-1 Graphs and Graph Models	3,4,5,6,7,8,9,10
10-2 Graph Terminology and Special Types of Graphs	1,2,3,4,5,6,20(a,b,c,d),21, 22, 23, 24, 25, 26(a,b), 35, 36,37,38,39,40,41, 48,49,59(a,b),60.
10-3 Representing Graphs and Graph Isomorphism	34,35,36,37,38,39,50,51,53,54,55.
10-4 Connectivity	1,2,3,4,5,6.
10-7 Planar Graphs	1,2,3,4,5,6,7,8,9,12,13,14.

Chapter11Trees

11.1 Introduction to Trees	2,4,6,8,10,16,17.
11.2 Application of Trees	1,2
11.4 Spanning Trees	2,3,4,5,6,7,8

Chapter12Boolean Algebra

12-1 Boolean Functions	1,2,3,4,5(b,d),6(c,d),11,28
12-2 Representing Boolean Functions	1(b,c,d),2(a,d),3(a,d),7(c)
12-3 Logic Gates	1,2,3,4,5,6
12-4 Minimization of Circuits	1,2,3,4(c),6(a,b),12,13 ,14.