Homework Study Guide

Problem 1: Alien Attack Plans

We are given n cities with specific attack methods.

Cities A and B must be attacked with all four methods (1 way each).

City C must be attacked with exactly 2 out of 4 methods (6 ways).

Remaining cities have 16 options each.

Final answer: 6 * 16^(n-3).

Problem 2: Parity Proofs

(a) If m and n are odd, their multiplication results in odd values, and subtraction results in even.

(b) If m is even and n is odd, subtraction results in odd.

(c) Expanding squares shows the expression results in even values.

Problem 3: Go Board Squares

Counting squares using the number of spaces between 19 lines.

1x1 squares: 18*18 = 324.

Largest square: 18*18 = 324 cm^2.

Set of all square sizes: {1^2, 2^2, ..., 18^2}.

9x9 squares: (18-9+1)^2 = 100.

Problem 4: Divisibility by 8

If x is odd, expressing x = 2k+1 and expanding x^2 - 1 leads to 8m, proving divisibility.

Problem 5: Recursive Sets

(a) Counting elements in nested sets, leading to final count of 3.

(b) Cartesian product recursion, final count is 4.