Discrete Structures-2025: Assignment-1

Due Date: 4th October, 2025

Full Marks: 30

(1) Prove that $\sqrt[3]{n}$ is irrational if and only if n is not perfect cube. **(15 Marks)**

(2) A rectangular checkerboard of order $x \times y$ has x rows and y columns with white and black squares appearing alternatively (see Figure 1 for an example of 8×8 checkerboard). A *domino* is two adjacent squares that are aligned along x-axis (called *horizontal domino*) or aligned along y-axis (called *vertical domino*).

Consider an $m \times n$ checkerboard with even number of cells that has two squares missing. One missing square is white and the other missing square is black. Then, prove that this checkerboard can be covered using dominoes. **(15 Marks)**
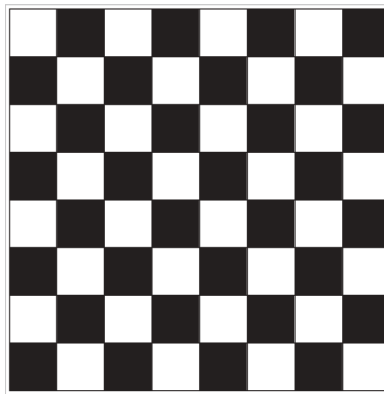
N.B. - You can use any combination of horizontal dominoes and vertical dominoes.

Figure 1: Illustration of a checkerboard.