Quiz 1A: Parity

CS/MATH 113 Discrete Mathematics L1

Habib University — Spring 2023

Total Marks: 5 | Date: January 16, 2023
Duration: 15 minutes | Time: 1715–1730h

Student ID: _____

Student Name: _____

1 Problems

1. (5 points) Given the following definitions, prove the claim below.

   Definition 1.1 (Even integer)**.** An integer is *even* if it can be written as $2k$ where k is an integer.

   Definition 1.2 (Odd integer)**.** An integer is *odd* if it can be written as $2k + 1$ where k is an integer.

   Definition 1.3 (Parity)**.** The *parity* of an integer is its property of being even or odd.

   Claim 1. *If an integer, n, is odd, then so in n^2.*

   Solution: We show below that if n is odd, then n^2 is also odd.

   Proof. Let $n = 2k + 1$ where k is an integer.
   Then $n^2 = 4k^2 + 4k + 1 = 2(2k^2 + 2k) + 1$.
   $2k^2 + 2k$ is an integer.
   $\therefore n^2$ is odd. □