
Section 3.2

3.8 (3.6 in second edition) Prove that if x is an odd integer, then $9x + 5$ is even.

3.10 (3.8 in second edition) Prove that if a and c are odd integers, then $ab + bc$ is even for every integer b.

Section 3.3

3.16 (3.12 in second edition) Let $x \in \mathbb{Z}$. Prove that if $7x + 5$ is odd, then x is even.

3.21 (3.18 in second edition) Let $n \in \mathbb{Z}$. Prove that $(n + 1)^2 - 1$ is even if and only if n is even.

3.58 (3.40 in second edition) Let $S = \{a, b, c, d\}$ be a set of four distinct integers. Prove that if either (1) for each $x \in S$, the integer x and the sum of any two of the remaining integers of S are of the same parity or (2) for each $x \in S$, the integer x and the sum of any two of the remaining three integers are of opposite parity, then every pair of integers of S is of the same parity.

Section 3.4

3.50 (3.36 in second edition): Let $x, y \in \mathbb{Z}$. Prove that if $3x + 5y$ is even, then x and y are of the same parity.

3.A (not in the text): Define $|x| = x$ if $x \geq 0$ and $|x| = -x$ if $x < 0$. Prove that $|x + y| \leq |x| + |y|$. Hint: Write a proof using cases.