

Chapter 3

Proving Techniques

1. Use a direct proof to show that the sum of two odd integer is even.
2. Use a direct proof to show that every odd integer is the difference of two squares.
3. Use a proof by contradiction to prove that the sum of an irrational number and a rational number is irrational
4. Prove or disprove that the product of a nonzero rational number and an irrational number is irrational.
5. Prove that if x is irrational, then $1/x$ is irrational.
6. Show that if n is an integer and $n^3 + 5$ is odd, then n is even using.
 - (a) a proof by contraposition.
 - (b) proof by contradiction.
7. Show that if you pick three socks from a drawer containing just blue socks and black socks, you must get either a pair of blue socks or a pair of black socks.
8. Show that the propositions $p_1, p_2, p_3, p_4,$ and p_5 can be shown to be equivalent by proving that the conditional statements $p_1 \rightarrow p_4, p_3 \rightarrow p_1, p_4 \rightarrow p_2, p_2 \rightarrow p_5$ and $p_5 \rightarrow p_3$ are true.