Math 311
Proof By Cases Activity

Instructions: This is a group activity. You must work together with your assigned group to answer these questions. Write a proof for each of the following propositions. Begin each proof by outlining the cases that you will consider.

1. **Proposition 1:** $|xy| = |x| \cdot |y|$ for any real number x and y.

2. **Proposition 2:** Prove that $x^2 + y^2 = 11$ has no integer solutions.

3. Formulate a conjecture about the decimal digits that appear as the final digit of the fourth power of an integer. Prove your conjecture using proof by cases.