ENGR 1181 | MATLAB 7: Logical Expressions
In-Class Guide

Learning Objectives
1. Apply logical operations correctly in arrays.
2. Analyze data using logical operators.

Textbook Reading
Chapter 6.1

Topics
This lecture contains the following topics:
1. Evaluating to True/False
2. Relational Operators
3. Logical Operators
4. Relational and Logical Operators Combined
5. Vectors

Outline
Below is an outline of the topics and the order in which they should be covered:

1. Evaluating to True/False
   a. In MATLAB, and programming in general:
      i. 1 = Logical True
      ii. 0 = Logical False
   b. MATLAB can evaluate mathematical statements and report the result as true or false, or as 1 or 0.
   c. Any non-zero number will evaluate to TRUE (1)
      i. For example: 8 would evaluate to TRUE (1)
   d. Zero will evaluate to FALSE (0)

2. Relational Operators (Instructor’s In-class Activity)
   a. Relational operators compare two numbers in a comparison statement.
      i. < Less than
      ii. <= Less than or equal to
      iii. > Greater than
      iv. >= Greater than or equal to
      v. == Equal to
      vi. ~= Not equal to
   b. Evaluating relational operators
      i. When we have MATLAB evaluate statements with relational operators, it’s like we are giving MATLAB a true-false test.
      ii. Show examples of evaluating relational operators.
3. **Logical Operators (Instructor's In-class Activity)**
   a. Logical operators compare two or more operands (numbers) to see if that combination is true or false. The result is assigned as true or false.
      i. & (AND) True if both are true
      ii. | (OR) True if either OR both are true
      iii. ~ (NOT) True if the operand is false
   b. **Show examples** evaluating logical operators.

4. **Relational and Logical Operators Combined (Instructor's In-class Activity)**
   a. Relational and logical operators can be combined in statements and evaluated.
   b. It is important to follow the MATLAB order of precedence with regard to relational and logical operators.
      i. Parentheses ()
      ii. Exponent ^
      iii. Logical 'NOT' ~
      iv. Multiply, Divide * /
      v. Add, Subtract + -
      vi. Relational Operators < > <= >= == ~=
      vii. Logical ‘AND’ &
      viii. Logical ‘OR’ |
   c. **Show examples** evaluating statements combining relational and logical operators.

5. **Vectors (Instructor's In-class Activity)**
   a. Relational and logical operators can be used on scalars, but it can be used over entire vectors as well. This will give a vector of true/false responses.
   b. **Show examples** of using relational and logical operators with vectors.

6. **Students will complete Part 1 of the assignment to turn in by the end of class.**
   Once finished, students may start on Part 2 due by the next class. Students will submit Part 1 of the assignment to the Carmen dropbox as a PDF.