(Print last name, first name, middle initial/name)

(Student ID)

Statement of integrity: I did not, and will not, break the rules of academic integrity on this exam:

Instructions:

- Read each problem *completely* before starting it!
- Do not use calculators, reference sheets, or any other material. This test is closed book.
- Solve each problem using MATLAB, except where indicated.
- Use only specified code in each problem.
- Write your solutions directly on the test using blue/black pen or pencil. Clearly indicate which problem that you are solving. You may write on the back of each sheet. If you need scrap paper, ask a proctor.

(Signature)

- Provide only *one* statement, expression, value, or comment per blank!
- Do not alter, add, or remove any code that surrounds the blanks and boxes.
- Do not supply multiple answers. If you do so, we will grade only one that we will choose.
- Show all work, especially algorithms. Better that you explain how you would solve a problem than to leave it blank.
- Follow good style! When possible, keep solutions general, avoid redundant code, use descriptive variables, use named constants, indent substructures, avoid breaking out of loops, and maintain other tenets of programming philosophy.
- Comment each control structure and major variable, *briefly*.
- Do not dwell on a problem if you get stuck. Do the other problems first!
- Raise your hand if have any questions.

Points:

- 1. _____ (20 points)
- 2. _____ (20 points)
- 3 _____ (40 points)
- 4. _____ (20 points)

Subtotal: ____/(100 points)

Bonus _____ (05 points)

Total: ____/(100 points)

 Problem 1
 [20 points] Terminology, Problem-solving process, MATLAB basics

la [1 point] Your lab instructor's name is ______.

1b [1 point] Fill in the blank: Programming is ______ problem-solving.

- *Ic* [2 points] Fill in the blank: MATLAB stands for ______
- *1d* [1 point] **True** or **false**: You may use a variable in MATLAB before giving it a value.
- *le* [1 point] Demonstrate the syntax of an assignment statement by storing the value 17 in a variable **x**.
- If [2 points] Demonstrate how to remove an assigned value from the variable \mathbf{x} from the command window.

Ig [3 points] Show one expression statement that will evaluate $\frac{9}{3-2(4+5)}$:

- Ih [2 points] What is the output from the following statements?
 >> 1 + 1; 3
- *Ii* [2 points] What is the output from the following statement? >> $(1 | 0) \& (1 > 0) | \sim 0$
- Ij [2 points] What is the output form the following statement?
 >> if 1, disp('hi!'), else, disp('bye!'), end
- *Ik* [3 points] Write a MATLAB expression that finds the remainder of 5/4, using the mod function. What is the remainder?
- *Il* [1 point] **True** or **false**: An algorithm is a collection of brief instructions that explain how to solve a problem. The statements are general enough that they can be implemented in most computer languages.

Problem 2 [20 points] Algorithms

Write a brief algorithm that explains how to obtain four numbers from a user and find the maximum value. Your algorithm will be graded on correctness, generality, and appropriateness. Reminder: An algorithm does not have code-specific elements.

Problem 3 [40 points] Selection Statements, Strings

Background: Assume that a company produces three kinds of boxes, which have the following descriptions based on the weight of the contents in pounds (lbs):

- Light boxes contain less than 10 lbs.
- Medium boxes contain between 10 and 50 lbs.
- Heavy boxes contain over 50 lbs.

About 50% of the time, a heavy box is very heavy, so the classification must be modified. Based on the weight classification, the company charges \$2 per pound to ship a box. If the box is very heavy, the company charges an additional \$1.50 per pound.

Task: Write a program that outputs the shipping charge for a box weight that a user inputs by doing the following tasks:

- Initialize minimum and maximum weights, using named constants for good style.
- Obtain the user-input weight. Assume that the user enters only legal values.
- Determine the initial classification based on the input weight. Store the classification as a string.
- Modify the classification if necessary.
- Determine and report the shipping charge.

Requirements: You will need to use the function **rand**, which returns a random value between 0 and 1. Be sure to comment your code briefly.

Problem 4 [20 points] Selection Statements, Boolean Values & Operators

Background: An *exclusive-or* is a boolean operator that has a different behavior than an *or* operator. When comparing two boolean expressions with an exclusive-or, the result is *true* if the expressions have different boolean values. Otherwise, the result is *false*. For example, MATLAB implements the exclusive-or as the function **xor**. So, **xor(1,0)** and **xor(0,1)** both produce a true value, whereas **xor(1,1)** and **xor(0,0)** both produce a false value.

Task: Fill in the blanks below to write a program that simulates an **xor** function by doing the following:

- Prompt the user to enter two *boolean* values, which you will store in **v1** and **v2**, respectively. Assume that the user enters only legal values.
- Use selection statements to simulate the **xor** function on **v1** and **v2**. For full credit, your code must be concise and not use any operators other than assign (=). Be sure to comment your code briefly.
- Output the result of your simulated **xor** function.

```
% Simulation of XOR function
% Obtain two logical values to test:
 v1 = input('Enter first boolean value: ');
 v2 = input('Enter second boolean value: ');
% Compare v1 and v2, assuming v1 is true:
 if _____
    if
            else
             _____;
 end
% Compare v1 and v2, assuming v1 is false:
 else
    if
            _____;
    else
             end
  end
% Output the result of the simulated XOR function
```

<u>Checklist</u>: Congratulations! You reached the last page of Prelim 1. Make sure that you clearly indicate your name, ID, and section. Also, re-read all of the problem descriptions/code comments/instructions. If you reached this part before exhausting the allotted time, check your test! Maybe you made a simple mistake? You should check the following:

- _____ maintained all assumptions
- remembered punctuation, such as semicolons and braces
- _____ didn't confuse *equals* with *assign* operators
- _____ completed all tasks
- _____ filled in ALL required blanks
- _____ given comments when necessary
- _____ declared all variables
- _____ maintained case-sensitivity
- _____ handled "special cases" correctly
- _____ indicated which solution to grade if you wrote multiple attempts
- *Bonus:* [5 points] You may do the following evaluation after you have finished writing and checking your prelim. We will give you extra time after the test end to complete this portion. To receive bonus points, tear this sheet off from the exam, make sure the proctor records the points on the front page, and put it in a separate pile to maintain anonymity.
- (1) What are 1 to 3 things we can do to improve lecture? (You may also say what you like, as well.)

(2) What are 1 to 3 things we can do to improve lab? (You may also say what you like, as well.)

(3) What are 1 to 3 things we can do to improve CS99, overall? (You may also say what you like, as well.)