DECISIONS, DECISIONS, DECISIONS

# **LAB 4 Worksheet**

Names: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Enhancing Your Computer Science Knowledge**

*This section of each lab will involve problems and software that will augment your understanding of concepts that are fundamental to Computer Science.*

For this and some upcoming labs, you will be using the *Invitation to Computer Science Laboratory Manual* and accompanying software. The Department has made these manuals available to you so that you don’t have to purchase them; **we only ask that you do not write in them, leave them in the lab, and take care of them so that we can make them available to future students as well!**

**Designing And Testing Simple Circuits**

**Do exercise 7.1, and draw the truth table.:**

In plain English (20 words or less), **describe what the circuit of Exercise 7.1 does.** Don’t refer to any components of the circuit or truth table – we want a general description!



**Do exercise 7.2, and draw the corresponding truth table.** (Note: don’t save this circuit)

**In plain English (20 words or less), describe what the circuit in 7.2 does.** Don’t refer to any components of the circuit or truth table – we want a general description!

**Draw the truth table for Exercise 7.4, and write the corresponding Boolean expression.**



**Print** the circuit of exercise 7.4 and attach the printout to your worksheet.



**Draw** the truth table and boolean expression for the Exclusive Or operation.



**Print** your Exclusive Or gate.

**Extending and Expanding**



**Once you’ve turned the clock face green, get your instructor’s signature on your worksheet.**



**Once you’ve also turned the gold portions green, get your instructor’s signature on your worksheet!**



**Print “lab4Expanding.py” and attach it to the back of your lab report.**

**Once you have completed your code and tested, demo your Finch for your instructor and get their signature on your worksheet!**

** Print “lab4FinchFun.py” and attach it to the back of your lab report.**

**Gates and Circuits in Python**



Describe what exactly you did to test it “exhaustively” (hint: that doesn’t mean test it until you are tired.)

**Show** your instructor your XOR program for signature.

**Print** “lab4XOR.py” and attach it to the Worksheet.

**Reflection:**

*The discussion questions in this section of each lab are meant to make you think critically and creatively about some of the things you did earlier in the lab. Your answers to these questions must not be written on the lab handout, but on separate sheets of paper attached to the end of your lab report. Your answers must not be handwritten, and you will be graded on all aspects of your answer (correctness, use of proper terminology, readability, use of complete sentences only, etc.). In general you are expected to write at least one or two paragraphs in answer to each question.*

We have been working with a system called Boolean logic. This is sometimes called 2-valued logic, because there are two possible values for everything: True and False. As we know, one reason for using this system is that the hardware devices used to build computers have 2 easily-distinguished states (on and off). Suppose now that each transistor had 3 easily-distinguished states and that therefore we wanted to build gates out of these transistors.

Describe the logical system that would result from this. What would you call this system? What would its three possible values be called, and what would they mean (we all know what True and False mean, for example)? How would the three basic operations (and, or, not) change? Would this system have any advantages over the two-valued system to which we are accustomed? Would you need new operations? If so, what would they look like? Be specific and use examples. Also use your imagination – there is no single correct answer here.