CECS 228 Name:  
LAB #1.2 ID: Date:

Objectives:

* Be able to translate English sentence to propositional logic
* Be able to prove logical equivalences
* Be able to apply De Morgan’s laws to negate a proposition.
* Be able to determine predicates

Exercise 1: Translate the given statement into propositional logic using the propositions provided.  
a. You cannot edit a protected Wikipedia entry unless you are an administrator. Express your answer in terms of e: You can edit a protected Wikipedia entry” and a: “You are an administrator”.  
 or   
  
b. You are eligible to be President of the U.S.A. only if you are at least 35 years old, were born in the U.S.A, or at the time of your birth both of your parents were citizens, and you have lived at least 14 years in the country. Express your answer in terms of e: “You are eligible to be President

of the U.S.A.,” a: “You are at least 35 years old,” b: “You were born in the U.S.A,” p: “At the time of your birth, both of your parents where citizens,” and r: “You have lived at least 14 years in the U.S.A.”

e → (a ∧ (b ∨p)∧r)  
  
Exercise 2: Use De Morgan’s laws to find the negation of each of the following statements.  
a. Carlos will bicycle or run tomorrow.  
Carlos will not bike and Carlos will not run tomorrow.

b. Jan is rich and happy.

Jan is not rich or Jan is not happy.

Exercise 3: Show that are logically equivalent by developing a series of logical equivalences.

by conditional statement

by distri

Exercise 4: Let Q(x,y) denote the statement “x is the capital of y.” What are these truth values?  
a. Q(Denver, Colorado) True  
  
b. Q(Detroit, Michigan) False  
  
c. Q(Massachusetts, Boston) False

d. Q(New York, New York) False

Exercise 5: Let P(x) be the statement “the word x contains the letter a.” What are these truth values?

a) P(orange) T

b) P(lemon) F

c) P(true) F

d) P(false) T

Exercise 6: Show that are NOT logically equivalent.

Pick p :F, q: T, and r:F.

Exercise 7: Show that is a tautology.