

You must work alone on your homework, and homework must be written legibly, single-sided on your own lined paper, or typed, with the answers clearly labeled and in the sequential order as assigned. You must write your name and university ID number in the upper right-hand corner of your homework. Staple all pages together and be sure that your name appears on every sheet.

1. (5 points) Write your name clearly on each page. Write the time and place of the first midterm. Read (and state that you did read) the syllabus.
2. (15 points) Convert the following sentences into logical expressions assuming the following definitions and predicates. (Hint: follow what is outlined in the syllabus.)
 - $A :=$ Aziza, a student in CMSC 250, Summer 2007
 - $w := A$ works hard
 - $h := A$ does all of the homework
 - $o := A$ turns in all of the homework on time
 - $u := A$ understands the material
 - $c := A$ cheats ☹
 - (a) Aziza works hard and does all of her homework, but she doesn't turn it in on time.
 - (b) Aziza does all that is outlined in the syllabus to do (assume the above predicates can express all that is necessary).
 - (c) Aziza works hard and does all her homework or she understands the material, but she never cheats.
3. (15 points) For each of the following translate the logical expression into an English statement, and then give the set of values that make the statement true. Assume values are restricted to the set of integers $\{-9,-7,-6,-5,-3,-1,0,2,4,6,8\}$. Also assume the following propositions.
 - $a := n$ is even
 - $b := n$ is positive
 - $c := n$ is an integer multiple of 3
 - (a) $\sim b \wedge c$
 - (b) $(a \wedge \sim b) \wedge \sim c$
 - (c) $c \wedge ((\sim a \wedge \sim b) \vee (a \wedge b))$
4. (15 points) Let a, b, c be statements. Construct the complete truth table for the following statements: $a \wedge ((\sim a \wedge \sim b) \vee (\sim b \wedge c))$.
5. (15 points) Let r, s be statements. Construct the complete truth table for the following statement: $(r \wedge \sim s) \vee (s \wedge \sim r)$.

What operator is this equal to?

6. (15 points) Let x, y, z be statements. Construct the complete truth table for the following statement: $((y \wedge \sim z) \vee (x \wedge y)) \wedge (y \wedge \sim z)$.
7. (20 points) Show the following are equivalent using truth tables:
 - (a) $(a \wedge b) \vee b \equiv b$
 - (b) $(a \vee b) \wedge b \equiv b$
8. (No points will be awarded for this assignment unless this is done) Sign your name to the following honor code statement: "I pledge on my honor that I have not given or received any unauthorized assistance on this assignment".