

HW 2: due Mon, September 21st

Part I: from *Richmond and Richmond* do problems:

Section 1.4 (pp. 33-34),6, 7,13; Secption 1.6 (pp. 46-47) 1, 2ad, 5ab, 6abc, 7.

Part II:

A. Does the conclusion follow? Justify your answer by writing the argument down formally and using the rules of inference. *I am a famous basketball player. Famous basketball players make lots of money. If I make lots of money, then you do what I say. I say you should buy sneakers that blink. Therefore, you should buy sneakers that blink*

B. Consider the following hypotheses: *If I take the bus or the subway, then I will be late for my appointment. If I take a cab, then I will not be late for my appointment, and I will be broke. I will be on time for my appointment.* Which conclusions *must* follow, i.e. can be inferred from the hypothesis? Justify your answers.

1. I will take a cab.
2. I will be broke
3. I will not take the subway
4. If I become broke, then I took a cab
5. If I take the bus, then I won't be broke

C. A set S of logical connectives is called *universal* if for any statement using *all* the connectives we know (i.e. $\{ \neg, \vee, \wedge, \rightarrow, \leftrightarrow, \oplus \}$) there is a logically equivalent statement using only the connectives in S.

1. Prove or disprove: The set $\{\neg, \vee, \wedge\}$ is universal
2. Prove or disprove: The set $\{\neg, \vee\}$ is universal

3. Prove or disprove: The set $\{\neg, \rightarrow\}$ is universal
4. Prove or disprove: The set $\{\neg, \leftrightarrow\}$ is universal
5. Let $|$ be a new logical connective defined as $A \mid B$ is *false* when A and B are both true, and otherwise $A \mid B$ is true.
   (a) Write down the truth table for $A \mid B$.
   (b) Can you find an expression using only the variable P and the *binary* connective $|$ that is equivalent to $\neg P$?
6. Prove or disprove: The smallest universal set S has size 2. (Hint: use previous problem).