ICS 6D—Winter 2024 (Dillencourt)
Homework 0 (Problems for Week 1)

1. Give the truth table for the proposition $q \wedge \neg(p \vee r)$.

2. Which of the following conditional statements are true and why?

   (a) If $3 \leq 0$, then $5 \geq 4$.

   (b) If 3 is a prime number then 5 is a prime number.

   (c) If 3 is a prime number then 4 is a prime number.

   (d) If 5 is an even number, then 4 is an odd number.

3. zyBook Exercise 1.3.3

4. zyBook Exercise 1.3.5 parts (a), (c), (e)

5. Problem deleted. (It was a duplicate of the previous problem.)

6. Use a truth table to show that the following two expressions are logically equivalent: $p \rightarrow q$ and $p \rightarrow (p \wedge q)$

7. zyBook Exercise 1.4.3 parts (b) and (d).

8. Translate each English sentence into a logical expression using the propositional variables defined below. Then negate the entire logical expression using parentheses and the negation operation. Apply De Morgan's law to the resulting expression and translate the final logical expression back into English. You should repeatedly apply De Morgan's law until the complement operator is applied only to individual variables.

   - `w`: the student has written permission from the instructor
   - `a`: the student has passed CS 145
   - `b`: the student has passed CS 151

   (a) The student has written permission from the instructor and has passed CS 145.

   (b) The student has written permission from the instructor or has passed CS 145 and CS 151.

9. zyBook Exercise 1.6.1 parts (b), (d), (f), (h)

10. zyBook Exercise 1.6.3

11. zyBook Exercise 1.6.4 parts (a), (c), (e)

12. zyBook Exercise 1.7.4 parts (a), (c), (e), (g), (i), (k)

13. zyBook Exercise 1.7.6

14. zyBook Exercise 1.8.1