Computer Science 2400
Fall 2021
Practice Quiz 1a
Propositional Logic

Circle the letter of the best answer for each multiple-choice question. Circle yes or no for each yes/no question.

1. Which of the following is equivalent to $\neg(p \rightarrow q)$?

    (a) $p \vee \neg q$

    (b) $q \vee \neg p$

    (c) $q \wedge \neg p$

    (d) $p \wedge \neg q$

2. Which of the following is equivalent to $\neg(p \wedge q)$?

    (a) $\neg p \wedge \neg q$

    (b) $\neg p \vee \neg q$

    (c) $\neg p \rightarrow \neg q$

    (d) $p \wedge \neg q$

3. Which of the following is equivalent to $\neg p \rightarrow \neg q$? (Hint. Use the law of the contrapositive.)

    (a) $p \rightarrow q$

    (b) $q \rightarrow p$

    (c) $\neg q \rightarrow \neg p$

    (d) $\neg q \vee \neg p$

4. Show a truth table for $p \to (q \lor \neg r)$.

5. Is $p \to (q \lor \neg r)$ a tautology? **yes no**

6. Is $p \to (q \to p)$ a tautology? **yes no**

7. Is $p \to (p \to q)$ a tautology? **yes no**

8. Which of the following is the converse of "If Grant studied hard then he got an A?"

   (a) If Grant got an A then he studied hard.
   (b) If Grant did not study hard then he did not get an A.
   (c) Grant studied hard and he got an A.
   (d) Grant studied hard and he did not get an A.

9. Which of the following is the contrapositive of "If Grant studied hard then he got an A?"

   (a) If Grant got an A then he studied hard.
   (b) If Grant did not study hard then he did not get an A.
   (c) If Grant did not get an A then he did not study hard.
   (d) Grant got an A then he did not study hard.

10. Let

   p be proposition   "you get an A on the final exam,"
   q be proposition   "you do every exercise in the book,"
   r be proposition   "you get an A in this class."

Which of the following expresses "you get an A in this class, but you do not do every exercise in the book?"

  (a) $r \rightarrow q$

  (b) $q \rightarrow r$

  (c) $q \wedge \neg r$

  (d) $r \wedge \neg q$

11. Let

   p be proposition   "you get an A on the final exam,"
   q be proposition   "you do every exercise in the book,"
   r be proposition   "you get an A in this class."

Which of the following expresses "To get an A in this class, it is necessary for you to get an A on the final exam?"

  (a) $p \rightarrow r$

  (b) $r \rightarrow p$

  (c) $p \wedge r$

  (d) $p \vee r$

12. Let

   p be proposition   "you get an A on the final exam,"
   q be proposition   "you do every exercise in the book,"
   r be proposition   "you get an A in this class."

Which of the following expresses "You will get an A in this class if and only if you either do every exercise in the book or you get an A on the final?"

  (a) $r \leftrightarrow (q \vee p)$

  (b) $r \wedge q \wedge r$

  (c) $r \rightarrow (q \vee p)$

  (d) $(q \vee p) \rightarrow r$