

Due: 24.08.19

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INSTRUCTIONS:

Topics and problems to be discussed in Tutorial in the week 26-31st Aug 2019.

1. **(Valid Statements)** Which of the following are valid statements.
 1. Please complete this assignment quickly.
 2. Hyderabad biryani is world famous.
 3. I will eat Biryani Today.
 4. Will you also eat Biryani Today?
 5. DS TAs are awesome.
 6. India will win ODI series.
 7. You must be crazy.
 8. Do this assignment correctly!
 9. Vote for Mickey Mouse!
 10. Has a trapezium got four sides?
 11. $x + y = 2$.
 12. discrete structures is going well for me.
 13. Is this statement valid?
 14. Please say that this is a valid statement.
 15. Won't you ever say that this is a valid statement?
 16. I agree that this is a valid statement.
 17. This statement is too long.
 18. You must be a fool to say that this is an invalid statement.
 19. It would be really kind of you to say that this is a valid statement.
 20. Here are the rules: Ignore all rules.
 21. The second sentence is correct. The first sentence is incorrect.
 22. Anyway, let us stop here.
2. **(Statement Formulas)** For the following, write these statements as statement formula.
 1. The number 8 is both even and a power of 2.
 2. The matrix A is not invertible.

3. There is a quiz scheduled for Wednesday or Friday.
4. The number x equals zero, but the number y does not.
5. At least one of the numbers x and y equals 0.
6. A matrix is invertible provided that its determinant is not zero.
7. For a function to be continuous, it is sufficient that it is differentiable.
8. An integer is divisible by 8 only if it is divisible by 4.
9. For a matrix to be invertible, it is necessary and sufficient that its determinant is not zero.

3. **(Truth tables)** Prove or disprove the equivalence using truth tables

1. $P \wedge (Q \vee R) \iff (P \wedge Q) \vee (P \wedge R)$
2. $P \rightarrow Q \iff (P \wedge \neg Q) \rightarrow (Q \wedge \neg Q)$
3. $\neg P \wedge (P \rightarrow Q) \iff \neg(Q \rightarrow P)$

4. **(Converse, Inverse, Contrapositive)** Write the converse, inverse, and contrapositive of the following statements.

1. If it is raining, then the home team wins.
2. If it rains, then they cancel school.
3. If two angles are congruent, then they have the same measure.
4. If a quadrilateral is a rectangle, then it has two pairs of parallel sides.

5. **(Equivalent statements without using truth table)** Which of the following (one or more) is equivalent to $\neg(p \rightarrow r) \rightarrow \neg q$?

1. $\neg(p \rightarrow r) \vee q$
 2. $(p \wedge \neg r) \vee q$
 3. $(\neg p \rightarrow \neg r) \vee q$
 4. $q \rightarrow (\neg p \vee r)$
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