Each task is worth 10 points.

1. V={1,2, … ,100}, E = {{p,q}:p,q∈V and |p-q| is a positive even number}, F = {{p,q}:p,q∈V and |p-q| is an odd number greater than 1}.

    (a) Is the graph (V,E) connected?

    (b) Is the graph (V,F) connected?

2. Consider a relation R on $\mathbf{R}^2$ such that $(a,b)R(c,d)$ iff $bc=ad$.

    (a) Is R an equivalence relation?

    (b) If the answer to (a) is YES, find its equivalence classes.

3. Determine whether the following proposition is a tautology: $(\sim q \wedge \sim r) \Rightarrow ((p \vee q) \vee (\sim p \vee r))$.

4. Show that the equation $A \cap (B \div C) = (A \cap B) \div (A \cap C)$ is true for every three sets A, B, C.

5. How many sequences of the length 10, with elements from {a, b, c} have exactly four "a" and at least three "b"?

6. How many permutations of the letters: DREAMORTEAM do not have identical consecutive letters?