Name_____   Instructor name _____

You must show and explain all work neat and organized to receive credit. Please show each step for calculations. YOU MUST TURN IN THIS SHEET to have your assignment graded.

1. (a) What are the equations for finding the equivalent resistance R_s and R_p for four resistors connected in series and in parallel, respectively? (b) Write down Kirchhoff's rules mathematically. (7 pts)

2. In the seven circuits shown below, there are two sets of three identical circuits and one "oddball." Identify the "oddball" and state which of the remaining circuits are electrically equivalent to each other. Using the concept of common points, explain why the circuits you identify are equivalent. (8 pts)
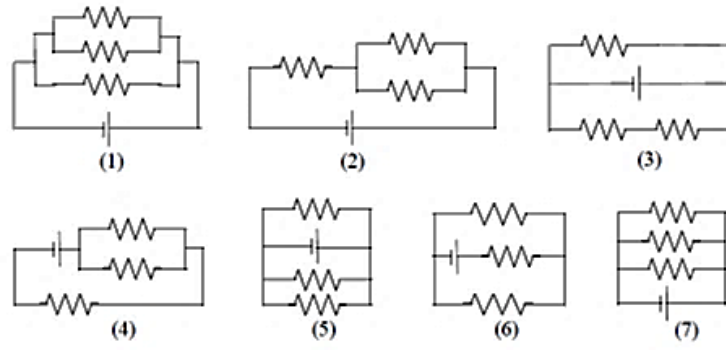
3. For the following circuits, circle the circuits that can be analyzed by separating them into simple series or parallel combinations. Draw a K on the circuits that must be analyzed using Kirchhoff's rules. Please give detailed explanations. (5 pts)