Memberships for the Basketball Booster Club

At a school basketball game, Thomas and Lisa sell memberships for the team's booster club. An adult membership costs $10, and a student membership costs $5. At the end of the evening, the students had sold 50 memberships for a total of $400.The club president wants to know how many of the new members are adults and how many are students.

A.
Let x stand for the number of $10 adult memberships and y for the number of $5 student memberships.

1. What equation relates x and y to the $400 income?
2. Give two solutions for your equation from part (1).
3. What equation relates x and y to the total of 50 new members?

Are the solutions you found in part (2) also solutions of this equation?

B.

1. Graph the two equations from Question A on a single coordinate grid.
2. Estimate the coordinates of the point where the graphs intersect. Explain what the coordinates tell you about the numbers of adult and student memberships sold.
3. Consider the graph of the equation that relates x and y to the $400 income. Could a point that is *not* on this graph be a solution to the equation?
4. Could there be a common solution for both of your equations that is *not* shown on your graph?

In Question A, you wrote a system of equations. One equation represents all (x, y) pairs that give a total income of $400, and the other represents all (x, y) pairs that give a total of 50 memberships. The coordinates of the intersection point satisfy both equations, or conditions. These coordinates are the *solution to the system*. Many real-life problems can be represented by systems of equations. In Question C, you'll practice solving such systems graphically.

C. Use graphic methods to solve each system. In each case, substitute the solution values into the equations to see if your solution is exact or an estimate.

1. $x + y = 4$ and $x - y = -2$
2. $2x + y = -1$ and $x - 2y = 7$
3. $2x + y = 3$ and $-x + 2y = 6$