Math 171
Systems of Equations and Inequalities

Solve:

1. \( y = \frac{1}{3}x + 3 \)
   \( y = 4x - 5 \)

2. \( 3x - 2y = 11 \)
   \( 2x + 3y = -5 \)

3. With the current, a boat can be rowed 24 miles in 3 hours. Against the current, a boat can be rowed \( \frac{3}{4} \) of the distance in 4 hours. Find the velocity that the boat can be rowed in still water.

4. \( 2x + 4y - z = 2 \)
   \( 3x - y + 2z = 4 \)
   \( x + y + z = -5 \)

5. \( x + y = 3 \)
   \( x + z = 3 \)
   \( y + z = 3 \)

Write the partial fraction decomposition of the given fraction:

6. \( \frac{4x + 3}{x(x+2)(x-3)} \)

7. \( \frac{3x^3 - 6x^2 + 7x - 2}{(x^2 - 2x + 2)^2} \)

Solve:

8. \( x^2 + y^2 - 4x - 6y - 4 = 0 \)
   \( x^2 - y^2 - 4x + 6y + 10 = 0 \)

9. \( x^3 + x - y + 2 = 0 \)
   \( x + y - 1 = 0 \)

10. A planets orbit follows the equation given by \( P(x) \) and a comet follows an orbit given by the equation \( C(x) \). Locate the collision point.

   \( P(x) : 16x^2 + 4y^2 = 64 \)
   \( C(x) : x^2 - y = -4 \)
Graph the inequalities:

11. \( y \leq 2x + 1 \)

12. \( x^2 + y^2 + y > 5 \)

13. \( 2x + y \geq 4 \)
   \( x - 2y < -2 \)

14. \( 3x < y \)
   \( 2x + y + 4 \leq -1 \)
   \( x > 2 \)
   \( y < 8 \)