Math 4
Name ____________________________
Hu  Midterm Review #3
(Quotient and Linear Eqns/Syst.)

Show all work on separate paper.

1. Find the difference quotient \( \frac{f(2+h) - f(2)}{h} \) and simplify for \( f(x) = \frac{1}{x-1} \)
2. Find the difference quotient \( \frac{f(x+h) - f(x)}{h} \) and simplify for \( f(x) = x^2 + 1 \)
3. Write the equation of the line with slope \( m = \frac{1}{2} \) and y-intercept \( b = -3 \).
4. Find the equation of the line with slope \( \frac{2}{3} \) passing through the point \( (9, -5) \).
5. Write the equation \( 2x - 3y = 5 \) in slope-intercept form. Give the slope and y-intercept.
6. Write the equation of a line through the point \( (3, -2) \) that is:
   a) Parallel to the y-axis. b) Parallel to the x-axis.
7. Write the slope-intercept form of the line through the points \( (6, -4) \) and \( (-3, 8) \).
8. Write the equation of a line that is parallel to the line \( 5x - 2y = 2 \) and that passes through the point \( (-2, -6) \).
9. Write the point-slope form of the line through the point \( (2, 5) \) that is perpendicular to the line \( 2x + 5y = 15 \).
10. Find the distance between the points \( (4, 2) \) and \( 6x = 8y - 1 \) using the formula: \( d = \sqrt{\frac{(Ax + By + C)^2}{A^2 + B^2}} \)
11. Graph each linear inequality. [Graph Paper]
   a) \( y + 1 \geq x \)  b) \( 2x + y < 4 \)
12. Graph the following piecewise function. [Graph Paper]

\[
  f(x) = \begin{cases} 
    9 - x^2 & \text{for } x \geq 1 \\
    -2 & \text{for } -2 \leq x < 1 \\
    2x + 4 & \text{for } x < -2 
  \end{cases}
\]
13. Solve the following system algebraically. Show all work as discussed in class.

\[
  \begin{align*}
    2x - 5y + 2 &= -10 \\
    x + 2y + 3z &= 26 \\
    -3x - 4y + 2z &= 5
  \end{align*}
\]