Directions: Please answer the following questions and make sure your answer are legible. You must show your work to receive credit for your answers. You may not use a calculator (or any other technology) on this quiz. Good Luck.

1. (11 points) For \( f(x) = \frac{3x^2 - 5x - 2}{x^2 - 9} \) \( (4.2 \# 10) \)
   
   (a) Find the domain
   
   (b) Find \( x \)- and \( y \)-intercepts of the graph of \( f(x) \) (if any)

   (c) Find vertical and horizontal asymptotes of the graph of \( f(x) \), (if any)

   (d) Find the holes of the of the graph of \( f(x) \) (if any)

   (e) Use the above and any other information you need to sketch the graph \( f(x) \). (Make sure to indicate asymptotes as dashed lines).

2. (3 points) Find all real solutions to the equation \( \frac{1}{x+3} + \frac{1}{x-3} = \frac{x^2-3}{x^2-9} \) \( (4.3 \# 3) \)
3. (11 points) Solve the given inequalities. Write your answer in interval notation.

(a) \[ \frac{x^2 - x - 12}{x^2 + x - 6} > 0 \]

\[
\frac{(x-4)(x+3)}{(x+3)(x-3)} > 0
\]

Not in Domain: \[ x = 3 \]
\[ x = 4 \]
\[ x = -2 \]

Solution: \((-\infty, -2) \cup (-2, 3) \cup (4, \infty)\)

(b) \[ \frac{x^4 - 4x^3 + x^2 - 2x - 15}{x^3 - 4x^2} \geq x \]

\[
\frac{x^4 - 4x^3 + x^2 - 2x - 15}{x^3 - 4x^2} \geq x
\]

\[
\frac{x^3 - 3x - 15}{(x^2)(x - 4)} \geq 0
\]

Not in Domain: \[ x = 4 \]
\[ x = 3 \]
\[ x = 0 \]

Solution: \([-5, 0] \cup [3, 4) \cup [5, \infty)\)