Steps to graph a rational function $R(x)$:

1. Factor the numerator and denominator and find the domain.

2. Write $R(x)$ in lowest terms (simplify) to get $S(x)$. Note $R(x)$ and $S(x)$ may be the same.
   e.g. If $R(x) = \frac{(x + 1)(x + 2)}{(x + 3)(x - 4)}$ then $S(x) = \frac{(x + 1)(x + 2)}{(x + 3)(x - 4)}$
   If $R(x) = \frac{(x + 1)(x + 2)}{(x + 2)(x - 4)}$ then $S(x) = \frac{(x + 1)}{(x - 4)}$, $x \neq -2$ and the graph has a hole at the point $(-2, S(-2))$. Plot the hole if it exists.

3. Locate the intercepts.
   - x-ints: Set $S(x) = 0$ and solve, or set the numerator of $S(x) = 0$ and solve (this is the same thing).
   - y-ints: Evaluate $S(0)$ if 0 is in the domain.
   Plot the intercepts on the graph

4. Find vertical asymptotes (V.A.), i.e. when is the denominator of $S(x) = 0$? Draw a vertical dashed line at these points.

5. Find the horizontal asymptotes (H.A.) and oblique asymptotes. Recall it is based on the degree of the numerator and denominator of $S(x)$. Draw a horizontal dashed line and figure out if the graph ever crosses the H.A.

6. Use the zeros of the numerator and denominator to break up the real number line. Use test points in each interval to find out where the graph is in each interval and plot the points.

7. Analyze the behavior near the asymptotes.

8. Draw a sweet graph.
Sketch the graph \( R(x) = \frac{(x - 1)(x - 4)}{(x^2 - 4)(x - 4)} \). Number each step and label your answers. Make sure to plot points as you go.
Sketch the graph \( R(x) = \frac{3x^2 - 3}{x^2 + x - 12} \). Number each step and label your answers. Make sure to plot points as you go.