

Please do the problems that you feel will help your group the most first (you don't have to do them in order). I suggest starting with #1 as it requires you to think critically about the properties of rational functions.

1. Create a rational function, $q(x)$ with the following properties (there are many correct answers).
 - (a) $q(x)$ has a hole at $x = 1$.
 - (b) $q(x)$ has two vertical asymptotes $x = -1, x = 3$.
 - (c) $q(x)$ has a horizontal asymptote at $y = 0$.
 - (d) $q(x)$ has $(2, 0)$ as an x -intercept.
2. Find all vertical, horizontal and slant asymptotes of the functions, as well as any x -intercepts or y -intercepts and holes. Use this to graph the function...
 - (a) $f(x) = \frac{x^2}{x^2+9}$
 - (b) $f(x) = \frac{x^2-x-2}{x^3-2x^2-5x+6}$
 - (c) $h(t) = \frac{2t^3+t^2-8t-4}{t^2-3t+2}$
 - (d) $f(x) = 2^{-2x}$
 - (e) $g(x) = 3^x$
3. Determine which values of x satisfy the equation.
 - (a) $e^{x-9} = e^8$
 - (b) $2^{x^2-1} = 1$
 - (c) $\frac{1}{32} = 2^{5x}$
 - (d) $(e^{x-3})^2 = e^{-9}$
4. Are the following true or false? Explain your reasoning/give a counterexample.
 - (a) Any a^x can be written as a product of a . i.e. $\underbrace{a \cdot a \cdot a \cdots a}_x$
 - (b) The functions $f(x) = \frac{x^2+3x+2}{x+2}$ and $g(x) = x + 1$ are equal (as functions).
 - (c) The range of e^{-2392x} is all real numbers.
 - (d) Exponential functions have inverse functions
 - (e) If $f(x)$ is a rational function with domain $(-\infty, a) \cup (a, \infty)$ Then the graph of $f(x)$ has a hole at a .
 - (f) You can use the one-to-one property of exponential functions to solve $2^{2x-1} = 3^{3x+1}$
5. Graph the inverse function of e^x by reflecting it across $y = x$. What is its domain and range?
6. Which will "grow" faster eventually, 2^x or x^2 ?