Building Understanding for Rational Functions With Asymptotes Through Graphing and Tables

Recall that equations of the form $y = \frac{1}{x}$ and $y = \frac{1}{x-1}$ have vertical and horizontal asymptotes. Let's explore some other rational functions:

Suppose $y = \frac{2x-1}{x}$.

- Graph this function is a zoom 4 Decimal window.
- Describe the asymptotes for this function.
- Based on transformations, what two transformations were performed on the parent function $y = \frac{1}{x}$ to create this new function.
- Re-write this function using the transformations.
- Algebraically manipulate the new function to show it is equal to $y = \frac{2x-1}{x}$.
- Simplify this function algebraically. What does it equal? Are there any restrictions?
- Create a set of table values for this function. What does this table tell you?

Suppose $y = \frac{x+1}{x}$.

- Graph this function is a zoom 4 Decimal window.
- Describe the asymptotes for this function.
- Based on transformations, what two transformations were performed on the parent function $y = \frac{1}{x}$ to create this new function.
- Re-write this function using the transformations.
- Algebraically manipulate the new function to show it is equal to $y = \frac{x+1}{x}$.
- Simplify this function algebraically. What does it equal? Are there any restrictions?
- Create a set of table values for this function. What does this table tell you?

Suppose $y = \frac{x-2}{x-1}$.

- Graph this function is a zoom 4 Decimal window.
- Describe the asymptotes for this function.
- Based on transformations, what two transformations were performed on the parent function $y = \frac{1}{x}$ to create this new function.
- Re-write this function using the transformations.
- Algebraically manipulate the new function to show it is equal to $y = \frac{x-2}{x-1}$.
- Simplify this function algebraically. What does it equal? Are there any restrictions?
- Create a set of table values for this function. What does this table tell you?

Suppose $y = \frac{2x-3}{x-1}$

- Graph this function is a zoom 4 Decimal window.
- Describe the asymptotes for this function.
- Based on transformations, what two transformations were performed on the parent function $y = \frac{1}{x}$ to create this new function.
- Re-write this function using the transformations.
- Algebraically manipulate the new function to show it is equal to $y = \frac{2x-3}{x-1}$.
- Simplify this function algebraically. What does it equal? Are there any restrictions?
- Create a set of table values for this function. What does this table tell you?