Goal: Use technology to produce a graph of $f(x) = \dfrac{x^2 - 4}{2x^3 + x + 1}$, with all key features labeled.

1. Without technology, find the following:

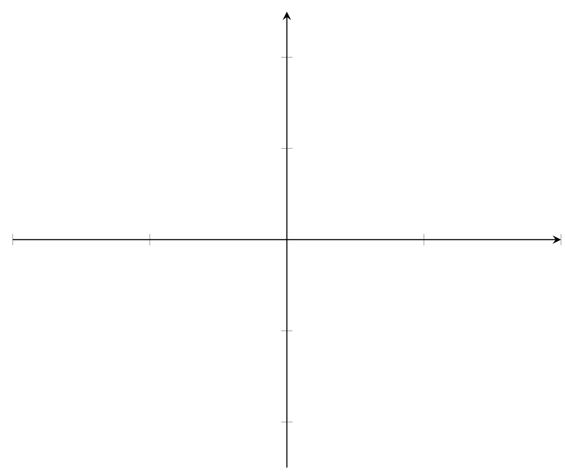
   Zeroes of $f(x)$: __________________________

   Horizontal asymptote of $f(x)$: __________________________

   To find vertical asymptotes, solve the equation:__________________________

2. Use technology to find the vertical asymptote(s) of $f(x)$:

3. Use technology to produce a first graph of $f(x)$. Label the scale on the axes.



4. From the graph, do you think there are local extrema? Explain. Yes/No/Not sure yet

   .

5. From the graph, do you think there are inflection points? Explain. Yes/No/Not sure yet

6. Use technology to calculate $f'(x)$. Then use technology to find all critical numbers of $f(x)$.

   $f'(x) =$

   Critical numbers of $f'(x)$:

7. Use technology to graph $f'(x)$, then use this graph to classify the critical numbers you found:

   $f(x)$ has a local maximum/minimum value of _____________ at $x =$_____________ because $f'(x)$ switches from _____________ to _____________ there.

   $f(x)$ has a local maximum/minimum value of _____________ at $x =$_____________ because $f'(x)$ switches from _____________ to _____________ there.

8. From the graph of $f'(x)$, how many inflection points do you predict? Explain.
   none/two/four or more/not sure yet

9. Use technology to calculate $f''(x)$. Then use technology to find where $f''(x) = 0$. Explain why the x-values where $f''(x)$ does not exist are not important here.

   $f''(x) =$

   Zeroes of $f''(x)$ (hint: numerator of $f''(x)$ must be zero):

   Why zeroes of denominator of $f''(x)$ are not important:

10. For each of the zeroes of $f''(x)$ you found above, determine whether or not $f(x)$ has an inflection point there. Use the graph of $f''(x)$ to justify your conclusions.

11. Return to the graph on the first page and label all key points. Draw a new graph if changing the scale is helpful.