

## Curve Sketching Homework

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**Instructions:** Sketch the graphs of the following functions. Write neat solutions. Make sure each solution has the following information (if applicable):

- Domain of  $f(x)$ .
- $x$ -intercepts and  $y$ -intercepts. If  $x$ -intercepts are hard to compute, then ignore them.
- Vertical asymptotes.
- Horizontal asymptotes.
- Intervals where  $f$  is increasing and decreasing.
- Local minima and local maxima.
- Intervals where  $f$  is concave up and concave down.
- Inflection points.
- Use the above information to sketch the graph of  $f$ . Here is a suggested sequence to do this:
  - Begin by first marking the  $x$  and  $y$  intercepts.
  - Draw the vertical and horizontal asymptotes.
  - Investigate how the function approaches the vertical asymptotes (this helps you start the sketch).
  - Investigate where the function is increasing and decreasing and sketch a rough picture.
  - Investigate the concavity and adjust your sketch.
  - Make sure to label all of the local extrema and inflection points.

1.

$$f(x) = 2 + 3x^2 - x^3$$

2.

$$f(x) = (4 - x^2)^5$$

3.

$$f(x) = \frac{x^2 + 5x}{25 - x^2}$$

4.

$$f(x) = \frac{1}{x^2 - 4}$$

5.

$$f(x) = \frac{(x - 1)^2}{x^2 + 1}$$