Curve Sketching Homework

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