Calculus I: Graphing and optimization review sheet

I suggest you alternate: one graph, one application, one graph, one application... That way, if you run out of time, you have done some of each.

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1) For each of the following, find the critical points, inflection points, asymptotes, sign chart and graph:

a. $f(x) = x^6 - 12000\,x^5 + 1000$

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

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

d. $f(x) = x^2 \ln x$

e. $f(x) = 5\,x^{7/5} - 35\,x^{2/5}$

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2) Solve the following:

a. If you need to print up posters with a total area of 154 inches^2, what dimensions should your poster be so that the printable area on it is as large as possible, if you want to have a 1 inch margin on the top and bottom and a 1.5 inch margin on the left and right sides? (In other words, you want the space left over between the margins to be as large as possible.)

b. A car rental company has determined that if they charge \$100 per car (per day), they will rent 150 cars. For every \$1 they raise the price, they will rent 5 fewer cars. How much should they charge so they will earn the most money if they have 200 total cars they can rent?

c. Find the point on the graph of $y^2 - x^2 = 1$ that is closest to (2, 0).

d. A closed cylindrical can is to be made out of 120 inches^2 of aluminum. What dimensions should this can have to hold the largest amount of liquid?