1. Find the intervals of increase and decrease of the given function, as well as all local extreme values.

   (a) \( f(x) = x^4 - 4x^3 + 4x^2 \)

   (b) \( g(x) = e^{2x} + e^{-x} \)

2. Use the first and second derivatives to sketch the graph of the given function. (Be sure to include any vertical or horizontal asymptotes in your sketch.)

   (a) \( f(x) = x^3 - 6x^2 - 15x + 10 \)

   (b) \( g(x) = \frac{1}{x^2 - 9} \)

3. A box with an open top is to be made by cutting small congruent squares from the corners of a 12 inch by 12 inch piece of cardboard and bending up the sides. How large should the corner squares be to make the box hold as much as possible?

4. A farmer has 2400 ft of fencing and wants to fence off a rectangular field that borders a straight river. The farmer needs no fence along the river. What are the dimensions of the field that has the largest area?

5. You are asked to design a one-liter can shaped like a right circular cylinder that uses the least amount of material. What dimensions should you use? Note that if the radius of the can, \( r \), and the height of the can, \( h \), are measured in centimeters, then the volume of the can in cubic centimeters is \( \pi r^2 h = 1000 \) (since 1 liter = 1000 cm\(^3\)).

6. The top and bottom margins of a poster are each 6 cm and the side margins are each 4 cm. If the area of the printed material on the poster is fixed at 384 cm\(^2\), find the dimensions of the poster with the smallest area.