More Difficult Applications of the Derivative

Directions: Do what it says.

1. Determine all local extrema of f, all intervals on which f is increasing or decreasing, all intervals of concavity, and all points of inflection.

a. $y = xe^x$

b. $y = x\sqrt{8 - x^2}$

c. $y = x\sqrt[3]{3x + 2}$

d. $f(x) = x^3 + 10x^2 + 25x - 50$

e. $f(x) = (x^2 - 1)^2$

f. $f(x) = x^4 - 4x^3 + 2$

2. Sketch the graph of $f(x) = x^4 - 2x^3$ by finding all local extrema, intervals on which f is increasing and decreasing, asymptotes, intercepts, intervals of concavity, and all points of inflection.

3. Sketch the graph of $y = \frac{-3x}{\sqrt{x^2+4}}$ by finding all local extrema, intervals on which f is increasing and decreasing, asymptotes, intercepts, intervals of concavity, and all points of inflection.

4. Sketch the graph of $f(x) = \frac{4-x^2}{x+3}$ by finding all local extrema, intervals on which f is increasing and decreasing, asymptotes, intercepts, intervals of concavity, and all points of inflection.

5. Sketch the graph of $y = \frac{(x+1)^2}{x^2+1}$ by finding all local extrema, intervals on which f is increasing and decreasing, asymptotes, intercepts, intervals of concavity, and all points of inflection.