Symbolic differentiation

Objectives: 1. Practice paper-and-pencil differentiation skills
2. Develop good habits of checking all results
   spend more time checking than calculating!!!!
3. Practice MAPLE syntax and develop basic understanding of computer algebra

Tasks: 1. For each function given below, use paper-and-pencil techniques to find a simplified formula for its derivative.
2. Only AFTER completing part 1, use MAPLE to re-affirm your calculations.
3. Compare both results, and, working on both sides, continue until both approaches match. Suitable MAPLE commands include simplify, combine, factor, expand, ...
   Ask for help when stuck.

Deliverables: None at this time. Above primary objectives will be assessed at the next test.

a. \( y = x^3 + 3x^2 - 1 \)  
b. \( y = \frac{1}{\sqrt{x}} - \sqrt{x} \)  
c. \( y = e^x - x^e \)

d. \( y = \frac{x^2 + 3x}{x^3 - 5x + 1} \)  
e. \( y = \frac{3x^2 - 4x + 5}{6x^4 - 12} \)  
f. \( y = \frac{2 + \sin 3x}{2 + \cos 3x} \)

g. \( y = \sin x^2 \)  
h. \( y = \sin^2 x \)  
i. \( y = (\sin x)^2 \)

j. \( y = 3 \sin^{-1} 5x \)  
k. \( y = \frac{7}{\sin x} \)  
l. \( y = 2x + 11 \arctan 3x \)

m. \( y = x \ln(x) + 4 \)  
n. \( y = x (\ln x + 4) \)  
o. \( y = (x - 1) \ln(x) \)

p. \( y = \ln 6x \)  
q. \( y = \frac{x^2 - \sqrt{x}}{x} - 3 \)  
r. \( y = \sin \frac{x^{1/3} - x^{1/4}}{3x - 7} \)

When finished, first look around and help other classmates; learn from them!!!
Then go back to the text-book and work the most challenging derivatives that you can find.