Finding Derivatives.

1. Find derivatives:

a) $y = \frac{2}{2x-1} - \frac{1}{x}$; $\qquad \left(y' = \frac{1-4x}{x^2(2x-1)^2}\right)$

b) $y = \arcsin x$; $\qquad \left(y' = \arcsin x + \frac{x}{\sqrt{1-x^2}}\right)$

c) $y = x^3 \ln x - \frac{x^3}{3}x$ $\qquad \left(y' = 3x^2 \ln x\right)$

d) $y = \sqrt{(x+a)(x+b)(x+c)}$; $\qquad \left(y' = \frac{3x^2 + 2(a+b+c) + ab + bc + ac}{2\sqrt{(x+a)(x+b)(x+c)}}\right)$

2. Find derivatives of composite functions:

a) $y = \frac{1}{3\cos^3 x} - \frac{1}{\cos x}$, $\qquad \left(y' = \frac{\sin^3 x}{\cos^4 x}\right)$

b) $y = \sqrt{1 + \arcsin x}$ $\qquad \left(y' = \frac{1}{2\sqrt{1-x^2}\sqrt{1+\arcsin x}}\right)$

c) $y = \frac{1+\cos 2x}{1-\cos 2x}$ $\qquad \left(y' = -2\frac{\cos x}{\sin^3 x}\right)$

d) $y = \frac{1}{3} \ln \frac{x^2 - 2x + 1}{x^2 + x + 1}$ $\qquad \left(y' = \frac{x+1}{x^3 - 1}\right)$

3. Find second derivatives:

a) $y = \frac{\arctan x}{1+x^2}$; $\qquad \left(y'' = \frac{(6x^2 - 2)\arctan x - 6x}{(x^2+1)^3}\right)$

b) $y = \frac{x}{1-x^2}$ $\qquad \left(y'' = -\frac{2x(x^2+3)}{(x^2-1)^3}\right)$

c) $y = e^{-x^2}$ $\qquad \left(y'' = e^{-x^2}(4x^2 - 2)\right)$