BECOME A MEMBER
ON STEADY

The Bright Side of Mathematics

Problem 1: For which x are the following functions defined and differentiable?

Calculate their respective derivatives.

(a) $f_1(x) = \frac{x^2 - e^{(x^2)}}{x^2 + (e^x)^2}$

(b) $f_2(x) = \log(\cos(x))$

(c) $f_3(x) = \arcsin(x) \cdot a^x$ for $a > 0$

Problem 2: Show that the derivative of an even function $f: \mathbb{R} \to \mathbb{R}$ is odd.

Show that the derivative of an odd function $f: \mathbb{R} \to \mathbb{R}$ is even.

Problem 3: Find a rational number $x \in \mathbb{Q}$ such that $\left| x - \sqrt{\frac{3}{2}} \right| < 0.003$.

Problem 4: Let $a, b \in \mathbb{R}$, $a < b$, $f: [a,b] \longrightarrow \mathbb{R}$ be a differentiable function.

Show:

(a) If $f'(x) = 0$ for all $x \in (a,b)$, then f is constant.

(b) If $f'(x) = f(x)$ for all $x \in (a,b)$, then $f(x) = ce^x$ for a constant $c \in \mathbb{R}$