# Putnam E.01

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# 1 Problems

**Putnam 1988/A1.** Let $R$ be the region consisting of the points $(x, y)$ of the cartesian plane satisfying both $|x| - |y| \leq 1$ and $|y| \leq 1$. Sketch the region $R$ and find its area.

**Putnam 1988/A2.** A not uncommon calculus mistake is to believe that the product rule for derivatives says that $(fg)' = f'g'$. If $f(x) = e^{x^2}$, determine, with proof, whether there exists an open interval $(a, b)$ and a nonzero function $g$ defined on $(a, b)$ such that this wrong product rule is true for $x$ in $(a, b)$.

**Putnam 1988/A3.** Determine, with proof, the set of real numbers $x$ for which

$$\sum_{n=1}^{\infty} \left( \frac{1}{n} \csc \frac{1}{n} - 1 \right)^x$$

converges.