

# Putnam E.02

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8 September 2020

## 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.