Putnam E.9

Po-Shen Loh

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1 Problems

Putnam 1984/A1. Let S be an $a \times b \times c$ brick, and let T be the set of points at distance 1 or less from S. Note that T includes all points of S. Find the volume of T.

Putnam 1984/A2. Evaluate

$$\frac{6}{(9-4)(3-2)} + \frac{36}{(27-8)(9-4)} + \cdots + \frac{6^n}{(3^{n+1}-2^{n+1})(3^n-2^n)} + \cdots$$

Putnam 1984/A3. Let A be the $2n \times 2n$ matrix whose diagonal elements are all x and whose off-diagonal elements $a_{ij} = a$ for $i+j$ even, and $a_{ij} = b$ for $i+j$ odd. Find $\lim_{x \to a} \frac{\det A}{(x-a)^{2n-2}}$.