1 Problems

Putnam 1981/A1. Let the largest power of 5 dividing $1^1 2^2 3^3 \cdots n^n$ be $5^{f(n)}$. What is $\lim_{n \to \infty} f(n)/n^2$?

Putnam 1981/A2. We can label the squares of an $8 \times 8$ chess board from from 1 to 64 in 64! different ways. For each way, we calculate $D$, the largest difference between the labels of two squares which are adjacent (orthogonally or diagonally). What is the smallest possible $D$?

Putnam 1981/A3. Evaluate:

$$\lim_{k \to \infty} e^{-k} \int_{R} \frac{e^x - e^y}{x - y} \, dx \, dy,$$

where $R$ is the rectangle $0 \leq x, y \leq k$. 