Putnam E.4

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1 Problems

Putnam 1986/A1. Find, with explanation, the maximum value of $f(x) = x^3 - 3x$ on the set of all real numbers x satisfying $x^4 + 36 \leq 13x^2$.

Putnam 1986/A2. What is the units (i.e., rightmost) digit of $\left\lfloor \frac{10^{20000}}{10^{100}+3} \right\rfloor$?

Putnam 1986/A3. Evaluate $\sum_{n=0}^{\infty} \operatorname{arccot}(n^2 + n + 1)$, where $\operatorname{arccot}(t)$ for $t \geq 0$ denotes the number θ in the interval $0 < \theta \leq \pi/2$ with $\cot \theta = t$.