1 Problems

Putnam 1980/B1. Determine all real $K$ for which

$$\cosh x \leq e^{Kx^2}$$

holds for all real $x$. Recall that

$$\cosh x = \frac{e^x + e^{-x}}{2}.$$ 

Putnam 1980/B2. Let $S$ be the region of space defined by the system

\begin{align*}
    x &\geq 0, \\
    y &\geq 0, \\
    z &\geq 0, \\
    x + y + z &\leq 11, \\
    2x + 4y + 3z &\leq 36, \\
    2x + 3z &\leq 24.
\end{align*}

Find the number of vertices and edges of $S$. For which $a, b$ is

$$ax + by + z \leq 2a + 5b + 4$$

for all points of $S$?

Putnam 1980/B3. Define $a_n$ by $a_0 = \alpha$, $a_{n+1} = 2a_n - n^2$. For which $\alpha$ are all $a_n$ positive?