3835. *Proposed by Marcel Chiriţă, Bucharest, Romania.*

Determine the functions $f : \mathbb{R} \to \mathbb{R}$, continuous at $x = 0$, for which $f(0) = 1$ and

$$3f(x) - 5f(\alpha x) + 2f(\alpha^2 x) = x^2 + x\,,$$

for all $x \in \mathbb{R}$, where $\alpha \in (0, 1)$ is fixed.

3836. *Proposed by Jung In Lee, Seoul Science High School, Seoul, Republic of Korea.*

Determine all triplets (a, b, c) of positive integers that satisfy

$$a! + b^b = c!$$

3837. *Proposed by Arkady Alt, San Jose, CA, USA.*

Let $(u_n)_{n\geq 0}$ be a sequence defined recursively by

$$u_{n+1} = \frac{u_n + u_{n-1} + u_{n-2} + u_{n-3}}{4},$$

for $n \geq 3$. Determine $\lim\limits_{n\to\infty} u_n$ in terms of u_0, u_1, u_2, u_3.

3838. *Proposed by Jung In Lee, Seoul Science High School, Seoul, Republic of Korea.*

Prove that there are no triplets (a, b, c) of distinct positive integers that satisfy the conditions:

- $a + b$ divides c^2, $b + c$ divides a^2, $c + a$ divides b^2, and
- the number of distinct prime factors of abc is at most 2.

3839. *Proposed by Peter Y. Woo, Biola University, La Mirada, CA, USA.*

Let ΔABC be an acute triangle, and P any point on the plane. Let AD, BE, CF be the altitudes of ΔABC. Let D', E', F' be the circumcentres of ΔPAD, ΔPBE, ΔPCF respectively. Prove that D', E', F' are collinear.

3840$\star$. *Proposed by Šefket Arslanagić, University of Sarajevo, Sarajevo, Bosnia and Herzegovina.*

Prove or disprove

$$a^3c + ab^3 + bc^3 \geq a^2b^2 + b^2c^2 + c^2a^2\,,$$

where $a, b, c > 0$.