Study $Ay = b$ where $A$, $b$, and $f$ are functions of $x \in \mathbb{R}^n$.

Is there a continuous solution?

Example. Solve

$$x^2 F_1 + y^2 F_2 + xy z^2 F_3 = xyz$$

for the $F_i$'s.

Can't? Looking at $(x, 0, z)$ get $F_1(x, 0, z) = 0$.

Likewise $F_2(0, y, z) = 0$.

So $F_1(0, 0, z) = F_2(0, 0, z) = 0$.

but when $(x, x, z) \to (0, 0, z)$ get

$$F_3(0, 0, z) = \frac{1}{z} \text{ not cont. at } z = 0.$$