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$$D_4 = \{\overset{x_0}{-10}, \overset{x_1}{-5}, \overset{x_2}{0}, \overset{x_3}{5}, \overset{x_4}{10}\}$$

I Ortogonalizacja Grama-Schmidta

$$\begin{cases} g_0(x) = f_0(x) \\ g_k(x) = f_k(x) - \sum_{i=0}^{k-1} \frac{\langle f_k, g_i \rangle}{\langle g_i, g_i \rangle} \cdot g_i \end{cases}$$

$f_0(x) = 1$

$f_1(x) = x$

$f_2(x) = x^2$

$$\boxed{g_0(x) = f_0(x) = 1}$$

$$\boxed{g_1(x) = x - \frac{-10-5+0+5+10}{1+1+1+1+1} = x}$$

$$g_2(x) = x^2 - \left(\frac{(-10)^2 + (-5)^2 + 0 + 5^2 + 10^2}{5} \cdot 1 + \frac{(-10)^3 + (-5)^3 + 0^3 + 5^3 + 10^3}{(-10)^2 + (-5)^2 + 0^2 + 5^2 + 10^2} \cdot x \right) *$$

$$\boxed{g_2(x) = x^2 - \frac{250}{5} = x^2 - 50}$$

II ciąg P_0, P_1, P_2

$$\begin{cases} P_0 = 1, \quad P_1 = x - c_1 \\ P_k = (x - c_k) P_{k-1} - d_{k-1} P_{k-2} \quad \text{dla } k = 2, 3, \ldots \end{cases}$$

$$c_k = \frac{\langle x P_{k-1}, \cancel{P_{k-2}} \rangle}{\langle P_{k-1}, P_{k-1} \rangle}$$

$$d_k = \frac{\langle P_{k-1}, P_{k-1} \rangle}{\langle P_{k-2}, P_{k-2} \rangle}$$

$$\boxed{P_0 = 1}$$

$$c_1 = \frac{-10-5+0+5+10}{5} = 0$$

$$\boxed{P_1 = x}$$

$$c_2 = \frac{(-10)^3 + (-5)^3 + 0^3 + 5^3 + 10^3}{(-10)^2 + (-5)^2 + 0^2 + 5^2 + 10^2} = 0$$

$$d_2 = \frac{(-10)^2 + (-5)^2 + 0^2 + 5^2 + 10^2}{5} = \frac{250}{5} = 50$$

$$\boxed{P_2 = x^2 - 50}$$