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EX.0.1.6, Sauer

Explain how to evaluate the polynomial for a given input x, using as few operations as possible. How many multiplications and how many additions are required?

a.
$$p(x) = a_0 + a_5 x^5 + a_{10} x^{10} + a_{15} x^{15}$$

b.
$$p(x) = a_7 x^7 + a_{12} x^{12} + a_{17} x^{17} + a_{22} x^{22} + a_{27} x^{27}$$

$$\begin{array}{ll}
\Omega. & \chi^2 = x * x \\
 & \chi^4 = \chi^2 * \chi^2 \\
 & \chi^5 = \chi^4 * \chi \\
 & \gamma^5 = \alpha_0 + \chi^5 \left(\alpha_5 + \chi^5 \left(\alpha_{10} + \chi^5, \alpha_{15} \right) \right)
\end{array}$$

In total, 6 multiplications, 3 additions, 0 power operator

b.
$$\chi^2 = \chi * \chi$$

 $\chi^4 = \chi^2 * \chi^2$
 $\chi^5 = \chi^4 * \chi$
 $\chi^7 = \chi^5 * \chi^2$

$$P(x) = x^7 * (a_7 + x^5 (a_{12} + x^5 (a_{17} + x^5 (a_{17} + x^5 a_{17}))))$$

In total, 9 multiplications, 4 additions, 0 power operator.