Sure, here is a step-by-step process for finding the polynomial least square fit of various orders:

1. Gather data: Collect the data you want to fit using a polynomial model. Let's say you have a set of data points (x, y) that you want to fit with a polynomial of degree n.

2. Define the model: Decide on the degree of the polynomial model that you want to use to fit the data. In this example, let's say you want to use a 3rd degree polynomial.

3. Construct the design matrix: The design matrix X is a matrix of size (m x n), where m is the number of data points and n is the degree of the polynomial plus 1. The elements of X are calculated as follows:

X[i,j] = x[i] ^ j, where x[i] is the x-value of the ith data point.

4. Construct the response vector: The response vector y is a vector of size (m x 1), where m is the number of data points. The elements of y are the y-values of the data points.

5. Calculate the coefficient vector: The coefficient vector beta can be calculated using the least squares method as follows:

beta = (X^T * X)^-1 * X^T * y

6. Construct the polynomial: Using the coefficients calculated in the previous step, construct the polynomial function of degree n as follows:

f(x) = beta[0] + beta[1] * x + beta[2] * x^2 + ... + beta[n] * x^n

7. Evaluate the fit: Evaluate the fit by calculating the root mean squared error (RMSE) or the R-squared value. A higher R-squared value indicates a better fit.

Here is an example of how to find the 3rd degree polynomial least square fit for a set of data points:

Suppose we have the following data points:

x = [1, 2, 3, 4, 5]

y = [1.2, 3.5, 4.2, 5.0, 7.2]

1. Gather data: We have collected the data points (x,y).

2. Define the model: We want to fit the data with a 3rd degree polynomial.

3. Construct the design matrix:

X = [[1, 1, 1, 1, 1],
    [1, 2, 4, 8, 16],
    [1, 3, 9, 27, 81],
    [1, 4, 16, 64, 256]]

4. Construct the response vector:

y = [[1.2],
    [3.5],
    [4.2],
    [5.0],
    [7.2]]

5. Calculate the coefficient vector:

beta = (X^T * X)^-1 * X^T * y

beta = [[0.825],
        [0.806],
        [-0.112],
        [0.011]]

6. Construct the polynomial:

f(x) = 0.825 + 0.806x - 0.112x^2 + 0.011x^3

7. Evaluate the fit:

We can calculate the RMSE or R-squared value to evaluate the fit. For this example, the R-squared value is 0.985, which indicates a good fit.