Lab 1: (Re)introduction to Matlab

Perform the following operations in a Matlab script.

Compute the values of the function:

$$z = f(x, y) = \exp(-2|x|) + 2\cos(\frac{\pi \cdot y}{2})$$

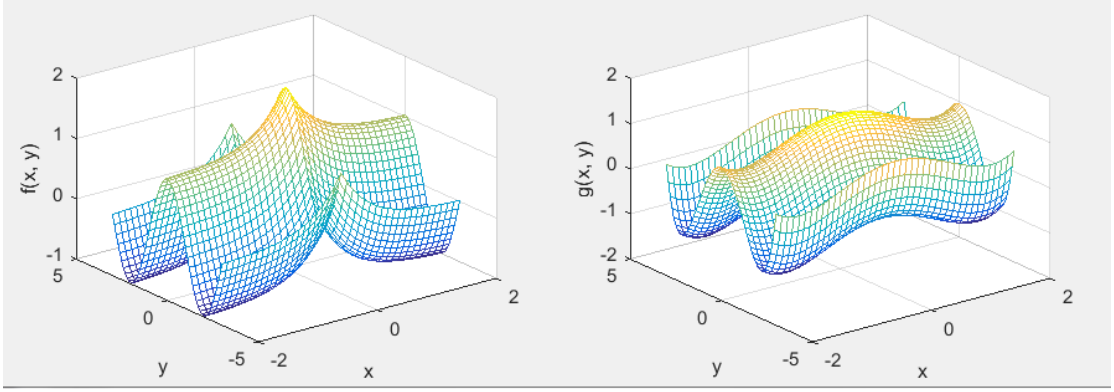
on the domain $[-2,2] \times [-3,3]$, using a grid with a step of 0.1.

A polynomial *g(x)* was fitted beforehand to approximate the above function:

$$\hat{z} = g(x, y) = 0.09276x^4 - 0.4881x^2 + 0.08078y^4 - 0.7813y^2 + 1.414$$

Implement this polynomial in a Matlab function that takes *x* and *y* at the input and produces *g(x, y)* at the output. Use this function to compute approximate values on the same grid as the one used to compute the true function above.

Create a 3D plot comparing z and $\hat{z}$. If everything goes well you should see something like the following figure:



Compute the mean squared error of the approximation on the same grid:

$$\frac{1}{N}\sum_{i=1}^{N}(z_i - \hat{z}_i)^2$$

where *N* is the number of points on the grid. Do not use a loop for this computation: do it in one line using Matlab vectorization! The correct error that you should obtain is 0.0336.

The solution so far should be created without any symbolic variables. Create now a symbolic version of the polynomial *g*, and verify that it computes the same values as your Matlab function on a few example points.