Homework 1

ECE 592

John Bumgardner/Nicholas Himes

Problem 1: Polynomial Curve Fitting

**Part a) Variance of test points**

Two functions we used are

and

**Exponential Function**

These functions were selected as they have well-defined Taylor Series approximations.

First, we used your starter code and modified it use the exponential function. To measure the error of the approximations, I used sklearn library to use their MSE function.

For N=100

A close up of a map

Description automatically generated

N=250

A close up of a map

Description automatically generated

N=1000

A close up of a map

Description automatically generated

N=10000

A close up of a map

Description automatically generated

|  |  |
| --- | --- |
| N | MSE |
| 100 | 0.002896852223742232 |
| 250 | 0.0006636921339989526 |
| 1000 | 0.000337337226696811 |
| 10000 | 3.640915307616189e-05 |

**Cosine**

N=100

A close up of a map

Description automatically generated

N=250

A close up of a map

Description automatically generated

N=1000

A close up of a map

Description automatically generated

N=10000

A close up of a map

Description automatically generated

|  |  |
| --- | --- |
| N | MSE |
| 100 | 0.0040027835641996455 |
| 250 | 0.001408109821452504 |
| 1000 | 0.0004845175348108981 |
| 10000 | 0.00035324891690888727 |

**Part b) Effect of noise**