Program na07

Overview: Compare interpolating polynomials visually with a function used to generate points.

Introduction: Write a module **interpolate.py**. One method computes coefficients for Newton's interpolating polynomial. Another evaluates the Newton's interpolation polynomial at a point *x*. Your main program file is **na07.py**. It should contain a function definition for a function f(x). We will use

$$f(x) = \frac{3.0}{1+x^2}$$

For $n = a, a+1, \ldots, b-1$ where $2 \le a < b < 31$, generate $n+1$ evenly spaced points on [– 3, 3] and find the interpolating polynomial of degree *n*. Using Visual Python, plot the interpolation points. Plot the function using 201 evenly spaced points in a different color, and plot the interpolating polynomial in a third color. Note: The coefficients of the interpolation polynomial should be calculated from $n+1$ points. This polynomial will then be evaluated at 201 points for the purposes of plotting and looking for the maximal error.
Print a table giving the degree of each polynomial used and the maximum absolute difference between the function *f* and that polynomial. There should be $b - a + 1$ entries in the table.

Input: Input *a* and *b* from the standard input window. Use a prompt. There is no other input for this program.

Example input:

```
2 4
```

Output: Except for the graphs, output should go to the standard output window. There should be a summary table giving the number of points of each interpolation polynomial and the max absolute value of the error on [–3, 3]. Use the format *a.b*E*m* for the error, where *b* represents a single digit.

Example output:

```
n    Error
2    1.4E0
3    1.4E0
Note: There should also be one window with three graphs,
f(x) and the two interpolation polynomials.
```

Writeup: Write a paragraph telling what happens as the degree of the polynomial gets larger. Use output from your program for illustration. The writeup should be in **na07.txt**.

Checklist:
Folder: **na07<lastname>**
Module file: **interpolate.py**
Program file: **na07.py**
Writeup file: **na07.txt**