MATH 248 FALL 2017 – LABORATORY ASSIGNMENT 3 – Sochacki
DUE: Tuesday October 17, 2017
POINTS: 50

1. Give the Maclaurin polynomial for cosine. Use this polynomial to give (a) cos(1) and (b) cos(100) accurate to five decimal places. (4 points)
2. Give the Taylor polynomial for $\ln(x)$. Use this polynomial to give (a) ln(0.1) (b) ln(0.1) and (c) ln(2) accurate to three decimal places. (4 points)
3. Let $p(x) = 2x^8 - 3x^5 + 2x^4 - 3x^3 + 2x - 1$. Give the following (a) $p(0)$ (b) $p'(0)$ (c) $p'''(0)$ (d) $p^{(6)}(0)$ (e) $p^{(8)}(0)$ (f) $p^{(9)}(0)$. (6 points)
4. Let $f(x) = \sum_{k=0}^{\infty} \frac{x^{2k}}{2^k}$. Give the following (a) the interval of convergence (b) $f(0)$ (c) $f'(0)$ (d) $f^{(6)}(0)$ (e) $f^{(9)}(0)$. (5 points)

You are to write a Matlab script that will

I. use an appropriate Taylor (Maclaurin) polynomial and the properties of the sine function to give an accurate approximation to sin(x). (10 points)
II. use a Newton Divided Difference polynomial based on ten data points given by your Taylor polynomial on the interval $[0, 2\pi]$ to approximate sin(x). (10 points)

Output:

(1) Give a nice table output showing your ten data values of sin(x) that will be used in your Newton Divided Difference polynomial. (3 points)

(2) Print out a nice table showing ten interesting values for the interval $[2\pi, 6\pi]$ for both your Taylor and your Newton polynomial. (3 points)

The remaining 5 points will be based on the 'professionalism' of your work.