AMSC 460 Homework Set 3 **Due: 21.05.04**

Note:

- Due: 2pm, May 4, 2021. Late submission is subject to automatic 20% reduction.
- When submitting, make sure you upload your matlab or python codes, in addition to your answer sheets to analytical questions.

Topic: Differentiation

Consider numerical differentiation schemes using

a. $-f(x_0-2h)+4f(x_0-h)-3f(x_0)$
b. $f(x_0-h)-2f(x_0)+f(x_0+h)$
c. $f(x_0-2h)-8f(x_0-h)+8f(x_0+h)-f(x_0+2h)$
d. $-f(x_0-2h)+16f(x_0-h)-30f(x_0)+16f(x_0+h)-f(x_0+2h)$

These are the same as Quiz no.7

For each scheme,

1. [5pts] identify the order of derivative

2. [5pts] Identify the order of truncation error

3. [10pts] Write a matlab or python code that gives the corresponding derivative at arbitrary x_0 any h

4. [20pts] For $f(x)=\exp(2x)$,
   a. obtain analytical form of corresponding derivative at arbitrary point x
   b. At $x_0=0$, obtain expected numerical value of the corresponding derivative
   c. Generate a figure equivalent to Fig.14.2 in the text book
   d. Comment on the figure.

Bonus Points: Quiz 6. Data Fitting Using Normal Equation

Indicate your choice:

A. Redo Quiz 6, and submit a new one
B. Keep original submission/points of Quiz.

Full points correspond to 2% towards final grade either way.