MATH 5610/6860
HOMEWORK #1, DUE TUE SEP 13

Notes: Common abbreviations for problem sources are: B&F (Burden and Faires, **ninth edition**, the class textbook) and K&C (Kincaid and Cheney). You do not need the K&C book to do homework assignments in this class.

1. B&F 1.1.2 a,b
2. B&F 1.1.8
3. B&F 1.3.3
4. K&C 1.2.8: The expressions e^h, $(1 - h^4)^{-1}$, $\cos(h)$, and $1 + \sin(h^3)$ all have the same limit as $h \to 0$. Express each in the following form with the best integer values of α and β.

$$f(h) = c + \mathcal{O}(h^\alpha) = c + o(h^\beta)$$

   Hint: The Taylor expansion of $(1 - h^4)^{-1}$ follows from that of $(1 - x)^{-1}$ by setting $x = h^4$. A similar approach works for $\sin(h^3)$.
5. K&C 2.1.10: Let $x = 2^3 + 2^{-19} + 2^{-22}$. Find the machine numbers (in IEEE single precision) that are just to the left and to the right of x. Determine $\text{fl}(x)$ (rounding to the nearest machine number), the absolute error $|\text{fl}(x) - x|$, and the relative error $|\text{fl}(x) - x|/|x|$. Verify that the relative error in this case does not exceed $\epsilon/2 = 2^{-24}$.