

**Numerical Computation**  
**Assignment 2**

1. Suppose  $f \in \mathcal{O}(h^k)$ , and  $g \in \mathcal{O}(h^m)$ , with  $m < k$ . Show that  $f + g \in \mathcal{O}(h^m)$ .
2. Prove that  $f(h) = h^3$  is *not* in  $\mathcal{O}(h^4)$  (*Hint: Proof by contradiction.*)
3. Rewrite  $\sqrt{x+1} - \sqrt{x}$  to get rid of subtractive cancellation when  $x$  is very large.
4. Use a Taylor's expansion to rid the expression  $1 - \cos^2 x$  of subtractive cancellation for  $x$  small. Use a  $\mathcal{O}(x^6)$  approximate.
5. Find the roots of the equation  $x^2 + 3x - 8^{-14} = 0$  with three-digit accuracy.