**Numerical Analysis Midterm Examination, 2012 Spring Semester**

1. 請推導出下列式子的round-off error, 假設X已含有Round-off error. (每一個計算也會產生error.) F(x) =  (10%)
2. 現有一組料如下：{(1, 4), (2, 3), (3, 0), (5, 4), (6, 4), (7, 3), (8, 0)}。
   1. Compute f(4) by using Langrange’s Polynomial Method.
   2. Compute f(4) by using Newton’s Interpolation Method. (15%)
3. 請利用以下的Data計算積分值：{(0.0, 0.0), (0.2, 1.5), (0.4, 1.0), (0.6, 0.5), (0.8, 1.0), (1.0, 1.5), (1.2, 2.0)}。(a) By using the Trapezoid Rule, (b) By using the Simpson’s Integration Method. (10%)
4.  (a) Please compute the root of f(x) by using the bisection method. Assume that the initial interval is [-1, 0]. 請計算3次。(b) 重複上述計算，但請使用Newton’s Method求根。Assume X0= 0. (15%)
5. 假設我們以下列方式計算一次微分：請推導Truncation Error. (10%)
6. Assume that f(x) = **ex**. 積分範圍=[0,1]. (a) How many sample points are need such that the truncation error is less than **10-3**? (b)若使用Simpson’s Method需多少Sample points? (15%)
7. 請描述Gauss Quadrature積分法。積分範圍=[0,1]. f(x)=ex 且truncation error=需多少Sample points才能讓Truncation error<0.001? (15%)
8. 請推導出Newton’s Method for computing the intersection of f(x,y) and g(x,y). (10%)