Error Bound in Lagrange Interpolation

E(f(x)) = E2(f(x)) = f(x) – Lagrange Approximation(fx)

= (f(n+1 derivation) \* (x-x0)(x-x1)(x-x2))/ (n+1 !)

= (f’’’(x) \* (x-x0)(x-x1)(x-x2))/ 3!

F(x) = Sin(x)

F’’’(x) = -Cos(x)

|F’’’| max in interval [0 1] is is cos(0) = 1

Let g(x) = (x-x0)(x-x1)(x-x2)) = x3 - 1.5x2 + 0.54x

g’(x) = 3x2 -3x +0.54

For maximum, make g(x) zero and find roots,

3x2 -3x +0.54 = 0

Roots are 0.235424868893541, 0.764575131106459

g(0.235424868893541) = 0.0570405183549043

g(0.764575131106459) = -0.0170405183549042

So max value of g(x) is 0. 0570405183549043 in [0,1]

Error bound is = (1 \* 0.0570405183549043)/6 = 0.00950675305915072

So error must be less than 0.00950675305915072