**All numeric quantities, if not exact, must be accurate to at least 5 significant digits.**

Use cubic splines with a natural boundary condition to construct a smooth curve through the data points (x0, y0) =(1,1), (x1, y1) = (2, 5), (x2, y2) = (3, 3), (x3, y3) =(4, 5), (x4, y4) =( 5, 2), (x5, y5) = (6, 3)

S0 = **1+5.98214286(x-1)+0(x-1)^2-1.98214286(x-1)^3**

S1 = **5+0.03571429(x-2)-5.94642857(x-2)^2+3.91071429(x-2)^3**

S2 = **3-0.125(x-3)+5.78571429(x-3)^2-3.66071429(x-3)^3**

S3 = **5+0.46428571(x-4)-5.19642857(x-4)^2+1.73214286(x-4)^3**

S4 = **2-4.73214286(x-5)+0(x-5)^2+5.73214286(x-5)^3**

Compute the Forward & Backward Differences to estimate f’(x2) given the following data points: (x0, y0) = (1,2), (x1, y1) = (2,4), (x2, y2) = (3,8), (x3, y3) = (4,16), (x4, y4) = (5,32)

Forward: f’(x2) = **8**

Backward f’(x2) = **4**

Given that f(x) =xsin(x) and the following data points: x[0] = 1.6, x[1] = 1.7, x[2] = 1.8, x[3] = 1.9, x[4] = 2.0

* Estimate f'(1.8) using x=1.8 as left hand endpoint in 3 point endpoint formula:

f’(1.8) = **0.572543030153647**

* Estimate f'(1.8) using the 5 point midpoint formula:

f’(1.8) = **0.564869018258465333333333333**

Given that f(x) = tan(x), a = 0, b = π/3, number of subintervals n = 10, use both the composite Simpson’s rule and composite Trapezoidal rule to provide estimates of

Simpson's estimate: **.69319493399996871499814**

Trapezoidal estimate: **.69319493399996871499814**

Given that f(x) = tan(x), a = 0, b = π/3, number of iterations n = 6, use the composite Trapezoidal rule with Richardson’s extrapolation to provide an estimate of

Estimate: **.693147181697719084362306**