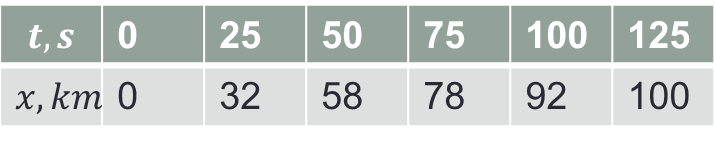
# Lab 10: Numerical Differentiation using Taylor Series

**Lab Task:**

1. The following data was collected for the distance travelled verses time for a rocket.



1. Estimate velocity at using two point forward difference formula/ forward difference formula of .
2. Estimate velocity at using three point central difference formula/central difference formula of .
3. Estimate velocity at using three point backward difference formula/ difference formula of .

## Code:

%Q1

X = [0,25,50,75,100,125];

Y = [0,32,58,78,92,100];

h = X(2)-X(1)

%Part a: two point forward difference formula at t = 25

v\_at\_25 = (Y(3) - Y(2))/h

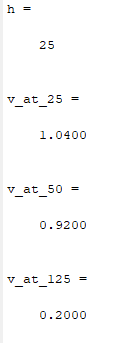
%Part b: three point central difference formula at t = 50

v\_at\_50 = (Y(4)-Y(2))/(2\*h)

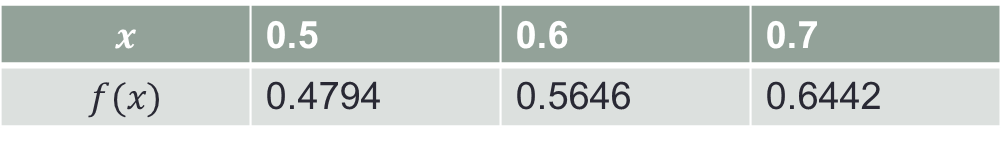
%Part c: three point backward difference formula at t = 125

v\_at\_125 = (3\*Y(6)-4\*Y(5)+Y(4))/(2\*h)

## Output:



1. Consider the following table of values.



1. Estimate using central difference formula of .
2. If then calculate error bound of central difference formula of .

## Code:

%Q2

X = [0.5,0.6,0.7];

Y = [0.4794, 0.5646, 0.6442];

h = X(2) - X(1)

a = (Y(3) + Y(1) -2\*Y(2)) /(h^2)

x = 0.7;

f = sin(x);

e = (h^2)/12 \* f

## Output:

