Computational Methods in Physics-I

Lab -9

1) The following data was collected for the distance travelled versus time for a rocket

t, s	0	25	50	75	100	125
x, km	0	32	58	78	92	100

Use numerical differentiation to estimate the rocket's velocity and acceleration at each time

2) Use Trapezoidal , Simpson's (1/3, 3/8) rule, Boole's and Weddle's rule for

a) $\int_{-2}^{2} x^3 e^x dx \ , n = 12$

b) $\int_{3}^{5} \frac{1}{\sqrt{x^2-4}} dx \ , n = 24$

3) A car laps a race track in 84 seconds. The speed of the car at each 6-second interval is Determined by using a radar gun and is given from the beginning of the lap in km/second, by The entries in the following table How long is the track ?

Time	0	6	12	18	24	30	36	42	48	54	60	66	72	78	84
Speed	124	134	148	156	147	133	121	109	99	85	78	89	104	116	123

4) Use Romberg integration to compute $\int_{0}^{48} \sqrt{1 + (\cos x)^2} \ dx$

5) Evaluate integral $\int_{0}^{1} \frac{dx}{1+x}$ using Gauss one point, two point and three point formula and Compare with Romberg integration.

6) Use MC integration to solve 2b) and 4) with 10^3, 10^5, 10^6, 10^7 sample size

7) Solve $\int_{1}^{4} \int_{1}^{4} \frac{1}{\sqrt{x+(1+y)^2}} dx dy$ using MC integration