Assignment 5

Problem # 1(Mark 40).

Evaluate the following integral

$$I = \int_{-2}^{4} (1 - x - 4x^3 + 2x^5)dx$$

a. Analytically.
b. Single application of trapezoidal rule;
c. Composite trapezoidal rule, with n =4
d. Single application of Simpson's 1/3 rule
e. Composite application of Simpson's 1/3 rule with n=4
f. Compare the above results in a table

Problem # 2 (Mark 30)

Following data were collected for the distance travelled versus time for a rocket

Time(s)	0	25	50	75	100	125
Distance(km)	0	32	58	85	92	100

a. Use numerical differentiation to estimate rocket's velocity and acceleration at each time.
b. Plot Time vs. Distance, Time vs. Velocity and Time vs. Acceleration.

Note: Please use central difference approximation for velocity and acceleration calculation

Problem # 3 (Mark 30)

Compute forward and backward difference approximations of $O(h)$ and $O(h^2)$, and central difference approximations of $O(h^2)$ and $O(h^4)$ for the first derivative of $y = \sin x$ at $x = \pi/4$ using a value of $h = \pi/12$.