

The velocity (v) of a falling parachutist has been recorded at different values of time (t), as follows:

Time (t) in sec	Velocity (v) in m/s	Time (t) in sec	Velocity (v) in m/s
5	27.96901	7.25	32.80078
5.25	28.64946	7.5	33.18849
5.5	29.28869	7.75	33.5527
5.75	29.88918	8	33.89486
6	30.4533	8.25	34.21628
6.25	30.98323	8.5	34.51823
6.5	31.48106	8.75	34.80188
6.75	31.94873	9	35.06835
7	32.38806	9.25	35.31867

Calculate the acceleration of the falling parachutist at time $t=7s$ using numerical differentiation. Consider the following methods:

- Forward difference approximation
- Backward difference approximation
- Central divided difference approximation

In each method, start with $\Delta t = 2s$ and gradually half it at each step upto $\Delta t = 0.25s$. Show the approximate relative error for each case (except $\Delta t = 2s$).