Analytical and Numberical solutions for simple harmonic oscillation $\Delta t=0.5,\,\omega=1.0,\,x_0=1.0$ 1.0 $x_{(t)} = x_0 \cos(\omega t)$ Runge - Kutta 1 $\begin{array}{c} & x_{(t)} = x_0 \mathrm{cos}(\omega t) \\ & Euler\ Cromer \\ & Euler\ Midpiont \end{array}$ 4 - Runge - Kutta 2 \bigcirc Runge – Kutta 4 Verlet3 Velocity Verlet 0.5 2 0.0 1 0 -0.5-1-2-1.02 25.0 6 20.0 22.5 27.5 30.0 0 t(s)t(s)1.0 $\begin{array}{l} \boldsymbol{-} \ v_{(t)} = - \ \omega x_0 \mathrm{sin}(\omega t) \\ \boldsymbol{-} \ Euler\ Cromer \\ \boldsymbol{-} \ Euler\ Midpiont \end{array}$ 2 Verlet Velocity Verlet 0.5 0 $v_{(t)}$ $v_{(t)}$ 0.0 -4-0.5 $v_{(t)} = -\omega x_0 \sin(\omega t)$ Runge - Kutta 1 \bigcirc Runge - Kutta 2 -6- Runge - Kutta 4 -1.022.5 6 20.0 25.0 27.5 30.0 2 8 0 t(s)t(s)