13.4: Motion in Space

Definitions for a particle with position vector $\underline{r}(t)$

- **Velocity**: $\underline{v}(t) = \underline{r}'(t)$
- **Speed**: $v(t) = |\underline{v}(t)| = |\underline{r}'(t)|$
- **Acceleration**: $\underline{a}(t) = \underline{v}'(t) = \underline{r}''(t)$
- **Newton's 2nd law**: $m\underline{a} = \Sigma\, \underline{F}$ sum of forces

Remarks

- By differentiating $\underline{r}(t)$ we can get $\underline{v}(t)$ and $\underline{a}(t)$
- By integrating $\underline{a}(t)$ we can get $\underline{v}(t)$ and $\underline{r}(t)$ upto some integration constants