Net Change as the Integral of a Rate - Handout/Worksheet

1. **Net Change as the Integral of a Rate**: The net change in $s(t)$ over an interval $[t_1, t_2]$ is given by the integral

$$\int_{t_1}^{t_2} s'(t)\, dt \;=\; s(t_2) - s(t_1)$$

2. **The Integral of Velocity** For an object in linear motion with velocity $v(t)$, then

$$\text{Displacement during } [t_1, t_2] = \int_{t_1}^{t_2} v(t)\, dt$$

$$\text{Distance traveled during } [t_1, t_2] = \int_{t_1}^{t_2} |v(t)|\, dt$$

3. A particle has velocity $v(t) = t^3 - 10t^2 + 24t$ m/s. Compute a) Displacement over $[0, 6]$ and b) Total distance traveled over $[0, 6]$.