

$$W = \int_{\vec{r}_1}^{\vec{r}_2} m \frac{d^2 \vec{r}(t)}{dt^2} \cdot d\vec{r}(t) .$$

$$W = \int_{t_1}^{t_2} m \frac{d^2 \vec{r}(t)}{dt^2} \cdot \frac{d\vec{r}(t)}{dt} dt$$