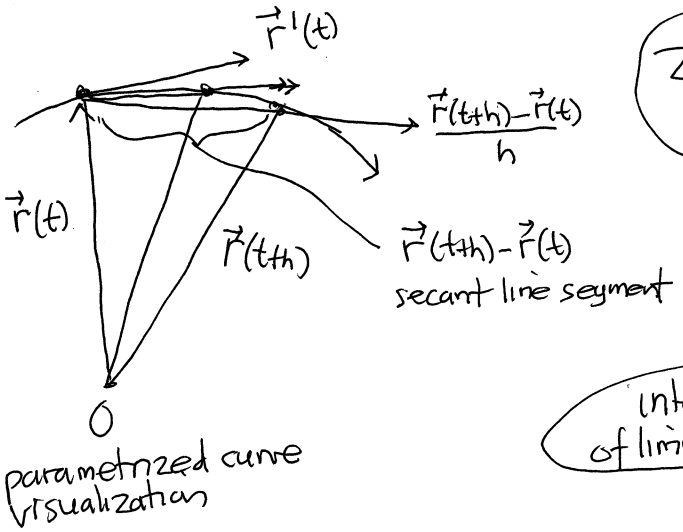
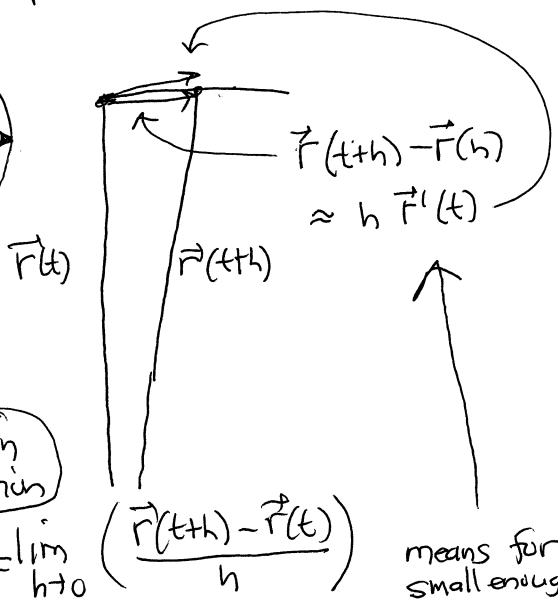
# vector valued function of 1 variable — parallel computation




zoom in →




interpretation of limit definition

$$\vec{r}'(t)=\lim_{h\to 0}\left(\frac{\vec{r}(t+h)-\vec{r}(t)}{h}\right)$$

means for small enough $h$

that $\frac{\vec{r}(t+h)-\vec{r}(t)}{h} \approx \vec{r}'(t)$

or $\vec{r}(t+h)-\vec{r}(t) \approx \vec{r}'(t)\,h$

relation to component derivative

$$\vec{r}'(t)=\lim_{h\to 0}\frac{\vec{r}(t+h)-\vec{r}(t)}{h}=\lim_{h\to 0}\frac{\langle x(t+h),y(t+h),z(t+h)\rangle-\langle x(t),y(t),z(t)\rangle}{h}$$

$$=\lim_{h\to 0}\left\langle\frac{x(t+h)-x(t)}{h},\frac{y(t+h)-y(t)}{h},\frac{z(t+h)-z(t)}{h}\right\rangle$$

$$=\left\langle\lim_{h\to 0}\frac{x(t+h)-x(t)}{h},\lim_{h\to 0}\frac{y(t+h)-y(t)}{h},\lim_{h\to 0}\frac{z(t+h)-z(t)}{h}\right\rangle$$

$$=\langle x'(t),y'(t),z'(t)\rangle$$

"parallel computation"
(simultaneous calc operations to all components of a vector-valued functions)