How do we apply limit on vector functions?

$$\lim_{x \to a} f(x) = f(a)$$

Do Now

Evaluate

$f(x) = 2x^2 - 3$

$$\lim_{x \to 0} f(x) = -3$$

$r(t) = \langle 2t^2 - 3, 2, 5e^t \rangle$

$$\lim_{t \to 0} r(t) = \langle -3, 2, 5 \rangle$$

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

Let $r(t) = \langle 2t^2-3, 2, 5e^t \rangle$

Find $r'(t)$.

$$\lim_{h\to 0} \frac{\langle 2(t+h)^2-3, 2, 5e^{t+h}\rangle - \langle 2t^2-3, 2, 5e^t\rangle}{h}$$

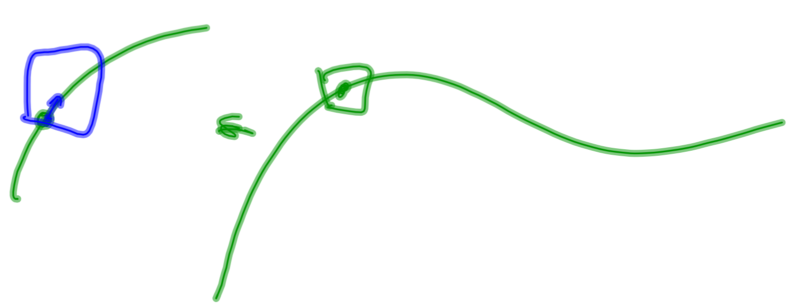
$$= \lim_{h\to 0} \left\langle \frac{2(t+h)^2-3)-(2t^2-3)}{h}, 0, \frac{5e^{t+h}-5e^t}{h} \right\rangle$$

$$= \lim_{h\to 0} \left\langle \frac{4th+2h^2}{h}, 0, 5e^t\left(\frac{e^h-1}{h}\right) \right\rangle$$

$$= \langle 4t, 0, 5e^t \rangle \leftarrow \text{tangent}$$

$t=0$ $\quad r(0) = \langle -3, 2, 5 \rangle$

$r(0.01) = \langle -2.9998, 2, 5.05 \rangle$



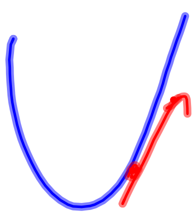
Tangent

$y = x^2$

$y' = 2x$

when $x = 1$

$y' = 2 \rightarrow \langle 1, 2 \rangle$



$r = \langle t, t^2 \rangle$

$r' = \langle 1, 2t \rangle = \langle 1, 2 \rangle$

$t = 1$