Math 131 Worksheet

16 September 2016

Suppose we have a position function $f(t)$. The corresponding velocity function $f'(t)$ is defined by the formula

$$f'(t) = \lim_{h \to 0} \left[\frac{f(t+h) - f(t)}{h} \right].$$

Another name for the velocity function is **the derivative** of f.

Example Suppose $f(t) = 1 + t^2$. Then

$$\begin{aligned} f'(t) &= \lim_{h \to 0} \left[\frac{f(t+h) - f(t)}{h} \right] \\ &= \lim_{h \to 0} \left[\frac{1 + (t+h)^2 - (1+t^2)}{h} \right] \\ &\vdots \\ &= \lim_{h \to 0} \left[\frac{2th + h^2}{h} \right] \\ &= \lim_{h \to 0} [2t + h] \\ &= 2t. \end{aligned}$$

Thus the derivative of $f(t) = 1 + t^2$ is the function $f'(t) = 2t$.

Here are some problems for you to do. You will need to use some of the methods from Tuesday's lecture. Spend about an hour on these problems; bring your work to class on Monday.

1. Suppose $f(t) = 3t - 5t^2$. Compute $f'(t)$.
2. Suppose $f(t) = \dfrac{1}{2+t}$. Compute $f'(t)$.
3. Suppose $f(t) = \sqrt{t}$. Compute $f'(t)$.
4. Suppose $f(t) = \dfrac{t}{5+t}$. Compute $f'(t)$.