

The Mechanical Universe – Episode 3: Derivatives

1. What a derivative is? Give two examples, different from video, where we use it to describe the world.
2. How can we determinate the slope at a particular point from a curve?
3. What is the difference between average and instant speed? What about average and instant acceleration?
4. Which are the three most important rules at the differential calculus?
5. Give me the instant speed ($\vec{v}(t)$) and the instant acceleration ($\vec{a}(t)$) of this movement:

$$\vec{r}(t) = (2 \cdot t^2 + 2)\vec{i} + \left(\frac{8}{3} \cdot t^3 + 1\right)\vec{j} + (t + 3)\vec{k}$$