Lesson 8: Instantaneous Rates of Change

1. Assume the number of measles cases in the U.S. t years after Jan 1, 2015 is given by $P(t) = -.2t^2 + .3t + 100$.

(a) What is $P'(t)$? What does this represent?

- $P'(t) = -.4t + .3$
- How quickly the number of measles cases are increasing or decreasing t years after Jan 1, 2015
- This is called the "rate of change" or "growth rate."

(b) What is the rate of change of the number of cases on Jan 1, 2018?

$P'(3) = -.4(3) + .3 = -.9$ cases/yr $\quad t = 3$

(c) How many cases of measles are there on Jan 1, 2018?

$P(3) = -.2(9) + .3(3) + 100 = 99.3$ cases

2. The amount of money Mr. Monopoly has in an account after 10 yrs is given by $A = Pe^2$

(A: end amount in millions; P: initial investment in millions)

(a) What is the rate of change of A with respect to P?

$\boxed{A' = e^2}$

(b) What is the rate of change of P with respect to A?

$P = \frac{1}{e^2}A$

$\boxed{P' = \frac{1}{e^2}}$

Def If $s(t)$ is the position function of an object, then $v(t) = s'(t)$ is the velocity and $a(t) = v'(t)$ is the acceleration.