

MATH 135– Calculus 1
Rates of Change, Slopes of Tangents
September 16, 2016

Background

We are now ready to move into Chapter 2 of our text and consider average rates of change, and eventually limits and tangent lines. *This is really the start of the subject of calculus itself.* Everything we have done up until now has been review of precalculus topics to prepare!

Questions

- 1) A ball dropped from a height of 40 meters and from a state of rest at time $t = 0$ has height $s(t) = 40 - 4.9t^2$ meters at time t seconds.
- (a) How far does the ball travel between $t = 1$ and $t = 1.5$? What is the ball's average velocity over that interval? (Note: Your answer should be negative. That just means the ball is moving downward.)
- (b) Complete the following table by following the same steps you did in part (a) for each of the given intervals. Use at least 5 decimal places in all calculations for these.

interval	[1, 1.1]	[1, 1.01]	[1, 1.001]	[1, 1.0001]
ave.vel.				

- (c) Using this information, estimate the velocity of the ball *right at the instant* $t = 1$. This is called the *instantaneous velocity* of the ball at that time.
- (d) Now repeat part (b) for these intervals *ending at* $t = 1$:

interval	[0.9, 1]	[0.99, 1]	[0.999, 1]	[0.9999, 1]
ave.vel.				

Are these results consistent with what you did before in part (b)? (They should be!)

- 2) Do problem 26 on page 62 in our text.
- 3) Do problem 27, parts (b), (c), (d) on page 62 in our text. The answer for part (a) would be “percent infected per day.”