PREREQUISITES FOR CALCULUS IN MOTION

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1. Introduction

This sheet contains a few useful facts that are good to know for Saturday, ranked more or less in order of importance. If you don't know them, don't worry - the entire point of this class is that we don't need that many linguistic abstractions to understand the world. It would be good to look them up, however, and it's perhaps a good check of how much you're expected to know to handle "actual" calculus.

2. Mandatory

(1) TRIGONOMETRY! This is unavoidable. Know that $\sin, \cos, \tan$ relate sides of a triangle. You should also have seen the unit circle. You don't need to know any trig identity outside of $\sin^2 + \cos^2 = 1$.

(2) Easy geometry area formulas: circle is πr^2, triangle is $\frac{1}{2}bh$ and so on. Be familiar with at least a picture proof of the circle area formula.

(3) Speed is defined as distance over time. **Velocity** is the *instantaneous change in position*. In particular, it's something that has both size (how fast is it going?) and direction (towards where?).

3. More or less Mandatory

(1) If you've taken any physics, the important notion is that the velocity of circular motion is tangent to the circle, and acceleration is centripetal. We might review this in class.

(2) In general, think about how you take "derivatives" when doing physics problems by considering infinitesimal quantities of physical objects.

4. Class will be more impactful if you know these

(1) If you already know calculus, remind yourself of the definition of the **Riemann integral**/Riemann sum, so you have something to compare with in your head.

(2) Likewise, it's good to compare our method with **polar coordinates**.

(3) We will discuss some seemingly sketchy geometry. Knowledge of **limits** will let you understand what's "really" going on.

(4) Likewise, knowing the geometric interpretation of a **derivative** is useful.