Math 8
Winter 2020

Preliminary Homework
Assigned Friday, February 7

Note: Preliminary homework is always graded credit or no credit. **You get full credit for completing the assignment, whether or not your answers are correct.** The purpose of preliminary homework is to start you thinking about the topic of the next class.

You may use your preliminary homework in activities with your classmates. You should be sure to think about these questions so you will be prepared.

Preliminary homework is always due at the *beginning* of class.

1. If an object travels at constant velocity $\vec{v}$ between times t_1 and t_2, and we can write $\vec{v} = V\vec{u}$, where V is a positive scalar and $\vec{u}$ is a unit vector, then:
   (a) The object's speed is _____
   (b) A unit vector in the direction the object is moving is _____
   (c) The length of time the object travels is _____
   (d) The distance the object travels is _____
   (e) The object's displacement is _____
   (Recall that the direction of displacement is the direction of motion, and the length of displacement is the distance traveled.)
   (f) Rewrite your answer to (e) so that $\vec{v}$ appears in the answer _____

2. An object travels at constant velocity between times t_1 and t_2.
   (a) If its velocity is $\vec{v}$, then its displacement is _____
   (Your answer should be written in terms of $\vec{v}$, t_1, and t_2.)
   (b) If its displacement is $\vec{d}$, then its velocity is _____
   (Your answer should be written in terms of $\vec{d}$, t_1, and t_2.)

3. An object travels around the unit circle in the xy-plane, and its position at time t is the point $(\cos t, \sin t)$ (with time and distance measured in your favorite units).
   (a) The object's displacement between times t and $t+\Delta t$ is _____
   (b) If Δt is small enough, it is not a bad approximation to suppose that between times t and $t + \Delta t$, the object is traveling at constant velocity.
   The object's velocity between times t and $t+\Delta t$ is approximately _____
   (Compute this using the length time the object travels, and the object's displacement, pretending the velocity is constant and solving for velocity.)
   (c) The object's instantaneous velocity at time t is _____
   (Take a limit as $\Delta t \to 0$.)