3/1 In Class – First Animation

Building off our previous work in class:

1. **First Animation!** Use one of your old codes that has 2D projectile motion in it. Or quickly redo it :) Problem 8 (first worksheet, suggested name `projectile.m`) would be good.

   Download the script file that I discussed in class (you can get it from class web page, in the calendar under today's date), and use that to make a red dot travel on your plot of y vs x for the projectile.

   Question: Is the time scaled to reality? How does that work?

   Show me!

2. **The incline plane**: An object released from rest slides down a frictionless incline plane. Start with the plane at an angle of 30° wrt the horizontal.

   (a) Go to the board and draw a free body diagram for the object. Then start from Newton's Second Law and find the acceleration along the incline (or the unrotated components of acceleration.)

   (b) Is the acceleration constant? If it is, you can use the kinematic equations to find the position of the object as a function of time. (You pretty much derived them last time. Ask me if you don't remember.) So we all know what s is: I called s the position along the incline plane.

   (c) Write your structure plan

   (d) Back to the computers to code it.

   (e) On one page, plot s vs t.

   (f) On another page, plot unrotated (x is horizontal, not along incline) x vs t and y vs t.

   (g) As a check, on a third page, plot y vs x. Do you get what you expect?

   (h) Play with the angle of the incline as another check. What happens if you use $\theta = 90°$? Is that what you expect?

   (i) What happens if you use $\theta = 0°$? Is it what you expect?

   (j) Put θ back to some angle other than 0 or 90°.

   (k) Show me the final plots. Make them look nice, and print them. Put your name on them and turn them in.

3. Animate the plot of y vs x from the last problem. Is it what you expect? You may need to play with the pause values to see the effect. Or make the incline really long. Show me.

4. **For homework:** Repeat the last two incline plane problems with friction! Use $\theta = 30°$, $\mu = 0.2$, and $m = 1$kg as starting values. But play with them. Your program should make the same plots as the last two problems, and show both without and with friction on same plots for all except y vs x (since that one should look the same!).

   For the animation, you only need the friction version of the y vs x.