Practice 1; Phys 185   Name _____

1. (0 points) You're on the surface of the moon, with an acceleration due to gravity of $g' = g/6$. There is no air on the moon, and therefore no air resistance. You stand at the edge of a crater that is 11.0 m deep, and kick a rock into the crater. Say you give the rock an initial speed of 4.9 m/s, and an angle of 23° with the horizontal. At what horizontal distance from the crater edge will the rock hit the bottom of the crater?
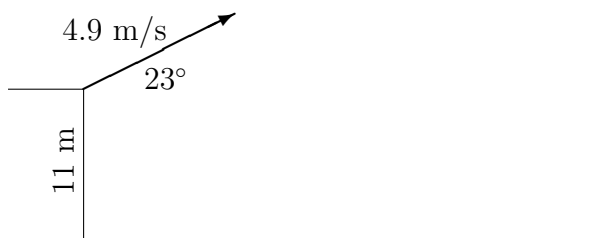
2. (0 points) The top graph displays how acceleration depends on time for an object. Note that the graph is linear, but this is not constant acceleration. Make a sketch of the corresponding velocity versus time and position versus time graphs for this motion, assuming that $v_{xi} = 0$ and $x_i = 0$ for the object at $t = 0$.

Get the numbers right for v_x at $t = 0, 2$, and 4 s. You don't need exact numbers for the x graph; just sketch the qualitative shape.
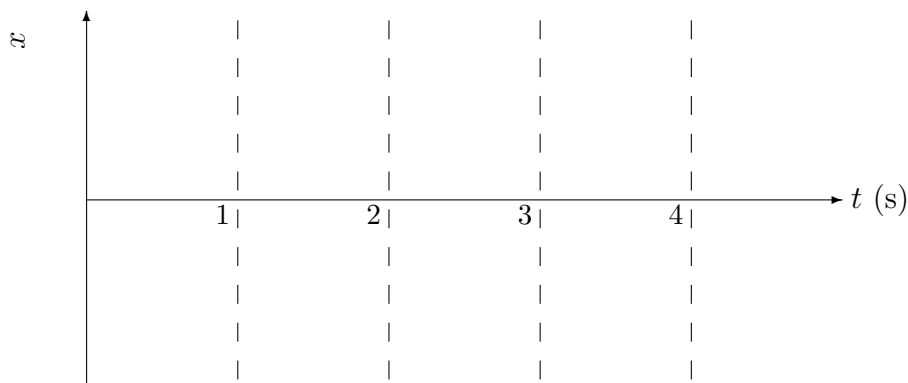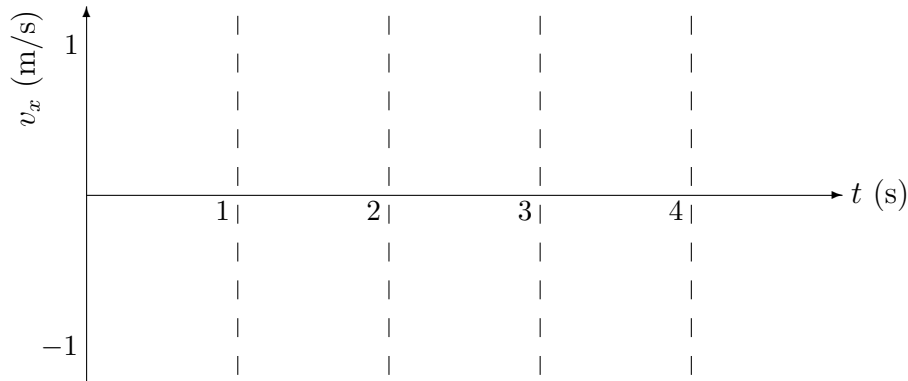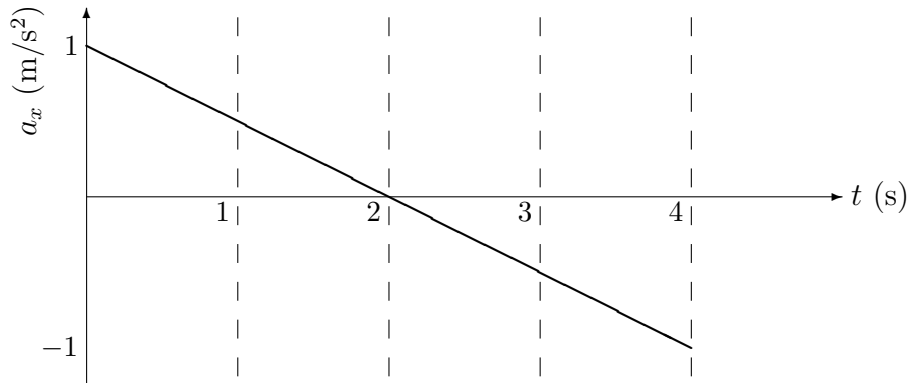
3. (0 points) You're doing the experiment in Lab 2, with the cart going up and down an inclined low-friction track. You notice that the accelerations going up and down are slightly different; $a_{\text{up}} = -2.1 \text{ m/s}^2$ and $a_{\text{down}} = -1.9 \text{ m/s}^2$; where these are accelerations along an x-axis tilted to be parallel with the track, with the $+x$-direction pointing up (away from the motion detector).

(a) Find θ, the angle at which the track is tilted. *Hint:* If you solve this symbolically, you'll find that θ depends on $\frac{1}{2}(a_{\text{up}} + a_{\text{down}})$ and g.

(b) on next page

(b) Find μ_k, the coefficient of kinetic friction between the track and the cart. *Hint:* If you solve this symbolically, you'll find that μ_k depends on $\frac{1}{2}(a_{\text{up}} - a_{\text{down}})$, g, and θ.

4. (0 points) You have an object with mass m moving on a flat surface, released with initial velocity v_i. The coefficient of kinetic friction between the surface and the mass is μ_k.

(a) Find the distance the object will travel before coming to a halt, in terms of v_i, μ_k, m, and g.

(b) You also have a second object which is released with the same initial velocity v_i. This second object is placed in a sleeve that reduces friction by 1%, so that its coefficient of kinetic friction with the surface is $0.99\mu_k$, but increases its total mass by 1%, so that its mass is $1.01m$. Which object will travel a larger distance before coming to a halt?

5. (0 points) You have two metal spheres which look identical in every respect. One is solid, and the other is hollow, so that the hollow sphere's mass is $m_h = 0.01 m_s$. You now do an experiment where you drop these two spheres simultaneously, from the same height.

(a) If you conduct the experiment in a vacuum (in a room where the air has been pumped out), which sphere will hit the floor first? Explain, using forces.

(b) If you conduct the experiment in an ordinary room, with air, which sphere will hit the floor first? Explain, using forces.