Physics 7A, Section 1 (Prof. Speliotopoulos)
First Midterm, Fall 2008
Berkeley, CA

Rules: *This midterm is closed book and closed notes. You are allowed two sides of one-half sheet of 8.5" x 11" of paper on which you can whatever note you wish. You are also allowed to use scientific calculators in general, but not ones which can communicate with other calculators through any means.* ***Anyone who does use wireless-capable will automatically receive a zero for this midterm.*** *Cell phones must be turned off during the exam, and placed in your backpacks.* ***In particular, cell-phone-based calculators cannot be used.***

Please make sure that you do the following during the midterm:

- *Write your name, discussion number, ID number on all documents you hand in.*
- *Make sure that the grader knows what s/he should grade by circling your final answer.*
- *Answer all questions that require a numerical answer to three significant figures.*

We will give partial credit on this midterm*, so if you are not altogether sure how to do a problem, or if you do not have time to complete a problem, be sure to write down as much information as you can on the problem. This includes any or all of the following: Drawing a clear diagram of the problem, telling us how you would do the problem if you had the time, telling us why you believe (in terms of physics) the answer you got to a problem is incorrect, and telling us how you would mathematically solve an equation or set of equations once the physics is given and the equations have been derived. Don't get too bogged down in the mathematics; we are looking to see how much physics you know, not how well you can solve math problems.*

If at any point in the exam you have any problems, just raise your hand, and we will see if we are able to answer it.

Name: ________________________________ *Disc Sec Number:* ________________________

Signature: _____________________________ *Disc Sec GSI:* ___________________________

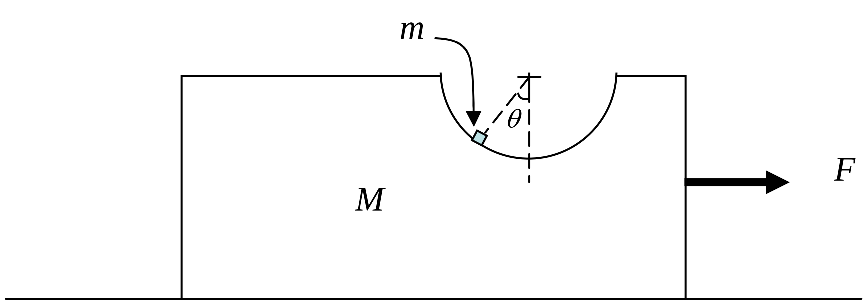
Student ID Number: ____________________

Problem	***Possible***	***Score***
1	20	
2	15	
3	25	
4	20	
5	20	
Total	100	

1. A car was stopped on a corner for a red light. Once the light turned green, the driver immediately steps on the gas and drives down the block. Before reaching the end of the block, however, the traffic lights in front of him turned red. The man immediately lets off the gas, steps on the brakes, and brings the car to a stop right in front of the next intersection. If it took the car 11 seconds to travel the block, how long was it? The car can accelerate with an acceleration of $a = 4.9 m/s^2$, and it can de-accelerate with an acceleration of $a_B = 11 m/s^2$.

2. Tom is walking beside a tall building when he suddenly sees a piece of gum hitting the ground in front of him. When the gum hit the ground, its velocity vector was at an angle of 70° from the horizontal. If Tom was walking a distance of 3 m from the building, from what height was the gum thrown? Assume that the gum was thrown horizontally from the building.

3. A cylinder is cut out of a large block with mass M sitting on a table. A small block of negligible size and mass m is place within the hole (see figure). The coefficient of static friction between the small block and the large block is μ_s, and you may assume that the friction between the large block and the table is negligible. What is the minimum and maximum value of F so that θ does not change?



4. A ball is attached by a string to a post, and is being whirled around with some speed. When the post is held still, $\theta_0 = 70°$ (see figure a). When the post is accelerated upward with acceleration *a*, this angle decreases and is now $\theta_{accel} = 60^\circ$ (see figure b). What is *a*? You can assume that the string has negligible mass, that the speed of the ball does not change, that the ball does not bobble up and down, and that the post is still vertical to the ground.

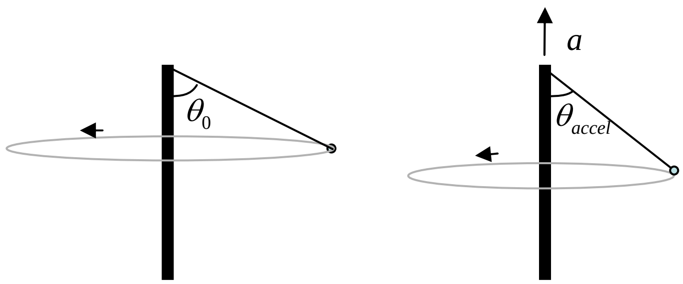


Figure a *Figure b*

5. A block slides in a circle within a bowl (see figure). The speed of the block is constant, and all surfaces are frictionless. What must the cross-sectional shape of the bowl be so that the time it takes the block to go around the circle once does not depend on its speed? In other words, how must the height, y, of the block depend on the radius, r, of the circle its path makes?