PHYS 111
HOMEWORK #8

Due : 6 Nov. 2014

There has been a trend toward merely asserting or quoting results without showing full work. No work = no credit. All answers must show complete derivations of your results.

1. A car travels along a banked curve of radius R making an angle θ with the horizon. In this case, the coefficient of friction between the car and road is μ. Find an expression for the maximum speed of the car before it slides up the bank. Find an expression for the minimum speed of the car before it slides down the bank.

2. The following is an actual exam question produced for the Chicago Public Schools by a nationally known educational consulting company : "Consider a package of weight W resting on a platform 1 meter above the surface of the Earth. What is the weight of the package if it is moved to a platform 3 m above the surface of the Earth?" The answer key provided by the nationally known (and highly, highly paid) company was W/9. (Really, I' m not making this up. Just walk up two meters and lose 89 % of your weight.) What "logic" did they employ to obtain this result? Now, as patiently as I did, please explain to them their error.

3. An astronaut orbits a newly discovered planet in the star system Ignatius 436 B. The astronaut discovers that the new planet has exactly the same radius as the Earth, but that the period of one revolution in low orbit is 44 minutes (the period of one revolution in low orbit around the Earth is 88 minutes). What is the density of the discovered planet? (The average density of the Earth is 5.5 $g \,/\, \mathrm{cm}^3$ (or 5500 $\mathrm{kg} \,/\, m^3$)).

4. Multiple choice question 6, p. 221

5. Conceptual question 6, p. 220

6. Multiple choice question 10, p. 221. For each option, state whether the statement is true or false, and then provide an explanation of your reasoning (saying only T or F will yield no credit.)

7. Problem 8, p. 222

8. A string of radius 5 m is attached to an object of 10 kg. The object moves in a horizontal circle completing 1 revolution every 2 s. How much work is done on the object by the string? Explain your answer fully.

9. Problem 18, p. 223.