## PHY 105 Lab Test 1 October 19, 2004 50 minutes La Salle University Dr. R. DiDio

## Do all work in the blue book!

- 1. [12 pts] In lab 2 you measured the acceleration of a cart moving down an inclined plane. You then compared the measured acceleration vs. the theoretical prediction for the acceleration, i.e.  $a = g \sin \theta$ . The angle  $\theta$  was measured by using a meter stick to first measure the tangent of the angle.
  - a) Assume that your measurement along the table was 1.0 m and that the distance from the table to the bottom of the track was 17.4 cm. Determine the angle  $\theta$  and calculate the theoretical value of the acceleration
  - b) Now assume that your meter stick readings are only accurate  $\pm 1$  mm. Using the values from (a), calculate the range of values appropriate to report for the theoretical value of acceleration.
- 2. [18 pts] In the following diagram, a knot is in equilibrium, similar to the setup of Lab 5.
  - a) Calculate the tension in each wire, and the angle  $\theta$ .
  - b) Assuming that the 50 g mass is constant and that the sting with  $T_1$  remains horizontal, how much mass would you add to the 100g mass to increase  $\theta$  by  $10^\circ$ ?



- 3. [12 pts] About errors in laboratory measurements:
  - a) Define systematic and random error. Describe how each of these will be recognizable in typical measurement data.
  - b) Describe in detail what you believe to be a clear case of random error in one of this semester's labs, and the potential reason(s) for this error.
  - c) Describe in detail what you believe to be a clear case of systematic error in one of this semester's labs, and the potential reason(s) for this error. How should you take this error into account when doing your data analysis?
- 4. [8 pts] In lab 3 a projectile was first launched vertically. Assuming that air resistance acts like a fractional force and always opposes motion, do you expect the graph of y(t), i.e. the vertical position of the projectile as a function of time, to be symmetrical? In other words, will the time elapsed in going up be equal to the time it takes to come back down? Explain and justify your answer!!!