

Name \_\_\_\_\_

## PHYS 221 Prelab

### Experiment 9- Torque and Rotational Motion

1. What is the objective of this experiment? (1 pt.)
2. What is torque and what is the condition for static equilibrium? (2 pts.)
3. Explain how you go from the vector equation  $\vec{\tau} = \vec{r} \times \vec{F}$  to using  $\tau = F d$  in the lab. (1 pt.)
4. Given the mass of the weight hanger clamps (16.5 g per clamp), calculate the amount of mass necessary to balance the apparatus in part 2 (**Quantitative analysis of torque**) of the procedure (see steps 3 & 4). Draw a diagram and show all work. Note that in torque calculations, distances of interest are *perpendicular distances* from the applied force to the axis of rotation (i.e., the fulcrum). (3 pts.)
5. Given the following setup, find the additional mass (in excess of the clamp) needed to balance the arrangement. The center of mass of the stick is at 50 cm, and its mass is 150 g. The clamp mass is 16.5 g and the fulcrum is located at 20 cm. See **One-person See-Saw** of procedure if necessary. Show all work. (3 pts.)

