Physics 303K Handout 8

1. **Midterm 2 Retrospective**

   The average score on the second midterm was 218.6 ± 48.3 out of 300 points possible. Because of an error on my part, only your overall grade is entered correctly (as of Thursday at 4pm). Everything else pertaining to Midterm 2 in Unique #56585 on the Homework Service is mismatched:

   (a) The solution sets are not the exams you took.

   (b) The list of which problems you got correct/incorrect is wrong.

   To rectify this, I have given you access to another Unique #56586 on the Homework Service. You can log into 56586 the same way you do 56585. In this unique number, you should only look at your version of midterm2, the solution set, and the grading information. You will have one week to look at and download this material. After that, you will no longer have access to 56586.

2. **Chapter 9.1 to 9.5**

   (a) Torque is $\vec{\tau} = \vec{r} \times \vec{F}$. The magnitude can be calculated as $|\vec{\tau}| = rFsin\theta$. Use the RHR for the cross product. Newton's second law for torque is $\sum \vec{\tau}_{ext} = I\alpha$.

   (b) Rotational equilibrium condition: $\sum \vec{\tau}_{ext} = \vec{0}$.
   Translational equilibrium condition: $\sum \vec{F}_{ext} = \vec{0}$. See Resnick, Halliday, Krane page 188 for a good procedure to analyze equilibrium problems.

   (c) Center of gravity vs. Center of mass

   (d) The moment of inertia for discrete particles is $I = \sum_n m_n r_n^2$. The moment of inertia for a continuous rigid body is $I = \int r^2 dm$.

   (e) Linear superposition: If you know the moments of inertia for two bodies rotating around the same axis I_1, I_2, then the total moment of inertia is $I = I_1 + I_2$.

   (f) The parallel axis theorem: If you know the moment of inertia I around an axis which passes through the center of mass, you can translate the axis by h and the new moment of inertia $I' = I + Mh^2$.

Matt Thrasher, thrasher@physics.utexas.edu, 3/04