

## Mechanics and Special Relativity, Spring 2006

### Homework Assignment # 3

(Due Wednesday, February 15, before the lecture.)

#### Lectures and Reading Assignments:

Readings are from “*An Introduction to Mechanics*” by Kleppner and Kolenkow.

- Lec 9, 2/10 (Fri): Classification of Forces. Contact Forces: Tension, Friction, the Normal Force **Sec. 2.5 (pp. 79–80, 87–97)**.
- Lec 10, 2/13 (Mon): More Contact Forces. **Sec. 2.5 (pp. 87–97)**.
- Lec 11, 2/15 (Wed): Gravity. **Sec. 2.5 (pp. 80–86)**.

#### Problems:

Numbered problems are from “*An Introduction to Mechanics*” by Kleppner and Kolenkow, Chapter 2 (pp. 103–109).

1. **Question 1:** Give an example of a coordinate system where  $\mathbf{F} \neq m\mathbf{a}$ . Explain why.
2. **Question 2:** Since the Earth is rotating around its axis, any object at rest with respect to the surface of the Earth is accelerated with respect to an inertial frame. Compute this acceleration (magnitude and direction) for an object on the Equator. What is the force that provides this acceleration?
3. Problem 2.5 (Please don't forget to indicate the *direction* of the acceleration of  $M$ .)
4. Problem 2.9
5. Problem 2.11
6. Problem 2.15 (Be careful when writing the constraint equations!)
7. Problem 2.16 (Hint: you'll find a useful discussion of a similar example in the book, p. 74.)
8. Problem 2.19