

# Physics 303K Handout 11

## 1 Midterm 3 Retrospective

The mean grade was  $42.2 \pm 18.3\%$ . This test was longer and more difficult than previous tests. Again, you should not be discouraged by a comparison of this numerical grade with grades you are accustomed to getting in other classes. Instead, you should compare yourself to the distribution, since this course is curved.

## 2 Other business

1. I am returning to you Extra Problem #3 graded today. The criterion and comment legend is posted online. The comments are keyed identically with the last two Extra Problems.
2. I cannot make my office hours TTh 10-11am anymore. I will instead add an extra hour Thursday nights after section. The other hour will be decided in class. Here are some possibilities: Th 12-1, Th 3-4, Tues 3-4, Mon 4-5, Fri 4-5.

## 3 Chapter 12: Potential Energy

1. **Conservative Forces** include the elastic restoring force (a.k.a. spring force, harmonic potential), gravity. A conservative force satisfies:

$$\oint \vec{F} \cdot d\vec{s} = 0. \quad (1)$$

A nonconservative force is friction.

2. **Potential Energy** is the energy associated with a configuration of a system. It is stored ability to do work

$$U(\vec{x}_f) - U(\vec{x}_i) = - \int_{\vec{x}_i}^{\vec{x}_f} \vec{F} \cdot d\vec{s}. \quad (2)$$

3. **Conservation of Mechanical Energy** holds if the system is isolated (i.e. External forces do no work. We also assume internal forces are conservative.).

$$E_{total} = KE + PE, \quad (3)$$

where  $PE$  is the total potential energy and  $KE$  is the total kinetic energy. Contributions to potential energy can come from gravity, spring force, etc. Contributions to kinetic energy can come from translation and rotation, where  $KE_{trans} = \frac{1}{2}mv^2$  and  $KE_{rot} = \frac{1}{2}I\omega^2$ .