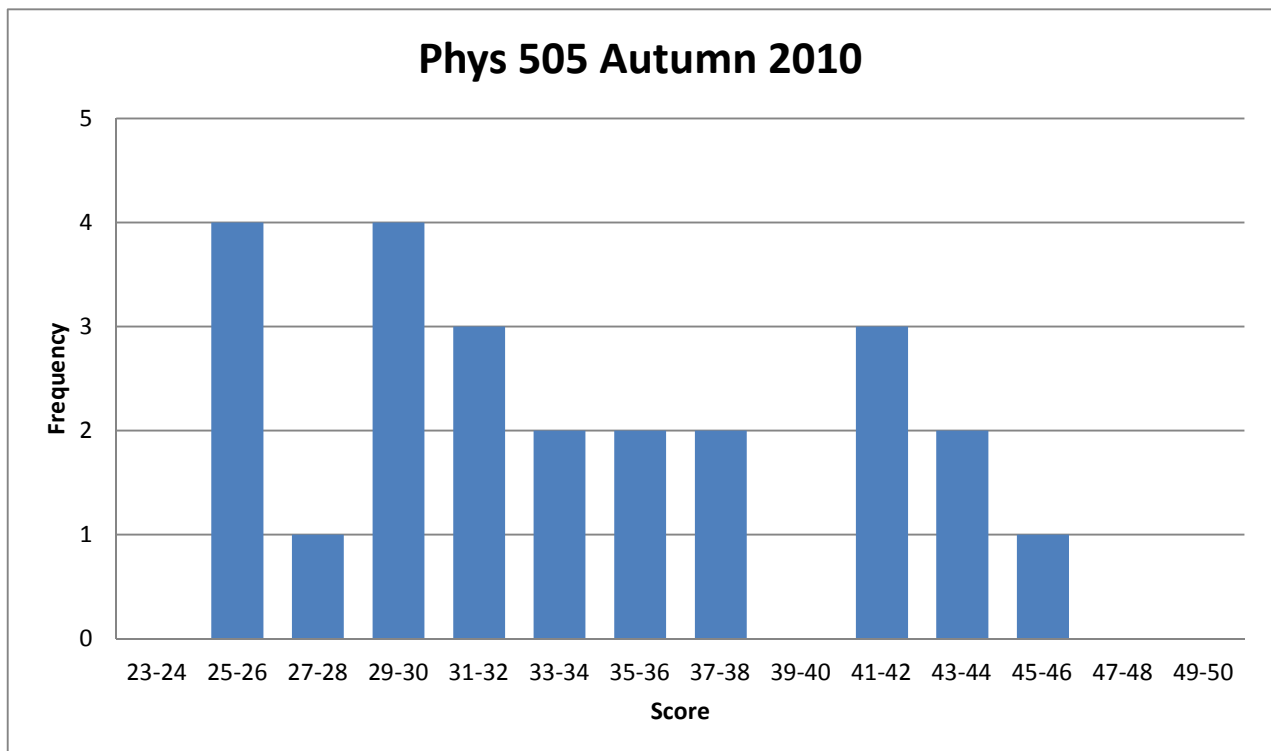


Midterm Results –

Average points – 33.9 (out of 50), High = 45, Low = 25

Average percentage 67.8 %, High = 90 %, Low = 50 %

The distributions look like –



This exam tells us many things. To help interpret the numbers I would suggest that satisfactory progress in Physics 505 (*i.e.*, a reasonable level of demonstrated competency) corresponds to an exam grade of ≥ 30 points ($\geq 60\%$).

You will recall that the goal of this course is essentially two-fold: to teach you (review for you) various useful concepts and equations in the context of classical mechanics (in preparation for quantum mechanics, quantum field theory and statistical mechanics) and to provide practice in applying these concepts (along with physical intuition) to the solution of non-trivial physics problems. In particular, we want to help you develop good problem solving habits, especially to train yourself to proceed carefully and to check your work as you go along. The idea of the exam questions is to ask you to apply these concepts to situations similar, but not precisely

identical, to those in the lectures and the HW. By any reasonable metric this exam was not too long and was similar to what we have discussed in class and in the HW. As many of you probably noticed, many parts were similar to last year's exam (although overall this year's exam had fewer parts). I have no problem with using old exams as a study aid, although I will not provide them. On the upside, I presume that looking at last year's exam led to (much) better performance on the two easy sections (II.a and II.c) that were very similar to last year's exam, but on the downside some changes from last year seem to have been missed.

As we discussed before the exam (and as is noted in the exam) the first 2 questions were meant to test whether you could apply the concepts of mechanics (invariances and conserved quantities, scattering in central potentials, motion in rotating reference frames) in a fairly qualitative fashion, with little actual calculation. The third problem was intended to test whether you could use Lagrangian based methods to solve a very familiar mechanical situation. The only essential difference in parts a) to c) from the "rolling" exercises discussed in Lecture 6 [disk on a sphere] and HW IV, exercise 3.17 [sphere on a sphere] is the moment of inertia of the rolling object, which changes only the details in part c. Thus it is disappointing that average performance on these 3 parts of problem III was just over 60%.

I will make some general comments here on how we can all work towards the goal I have for us, and will put more specific comments in the solutions. As I have mentioned several times in class it is essential to develop good habits so that you can check for simple mistakes (transcription errors, arithmetic errors, simple conceptual errors) *as you go along*. Typical examples that would have been relevant on this exam include dimensional analysis (all terms in an equation MUST have the same dimensions/units) or checking to see that gravity is defined so that masses fall down rather than up. Another frequent issue on all of the problems appeared to be carefully reading and following the instructions.

Finally note that the general issue of attacking somewhat familiar problems using completely familiar tools and just following the rules, even when we cannot guess the answer, is precisely what research is all about. The point of graduate school is to become comfortable and efficient with this approach.