M-12b: SHM and Resonance   Name_____
Lab Worksheet   **Group member names**_____

This sheet is the lab document your TA will use to score your lab. It is to be turned in at the end of lab. To receive full credit you must use complete sentences and explain your reasoning clearly.

This lab has been chosen for the lab writeup and will be worth more than the regular labs. It is NOT to be worked on at home and WILL be turned in at the end of your lab session. Our goal here is to expose you to the demands placed on lab researchers with regards to record keeping during experiments. Lab notebooks often become legal documents for the demonstration of propriety rights in patent cases. As such, they are written in pen and nothing is ever erased. You will not lose points no matter how many things you cross out but you may lose points for erasures or obliterations; a simple line drawn through something you want ignored will do. Your TA will explain more fully but essentially you need to write down the things necessary for another to duplicate your experiment and verify your results. You do not need to copy the equipment instructions out of the lab manual as that will be available to those verifying your results. If you need more space extra blank paper is available.

M-12b Simple Harmonic Motion and Resonance:

The lab has many parts but you will do only the following three. **Experiment III** (p.77) is about finding *k* with Hooke's Law. **Experiment IV** (pp. 78-79) asks you to show the phase relationships between position, velocity, *KE*, and *PE* as well as demonstrate energy conservation. **Experiment VI** (pp. 82-83) is about forced oscillations and resonance.

Experiment III:

Your TA will show you the "knife edge" used to measure the spring constant, *k*. Record data, plots and calculations below. Include brief explanations so a reader can follow your calculations and know where all your numbers come from.

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Experiment IV:

Do procedures and questions 1-10 and record your data, plots, tables, and calculations below. Please use complete sentences. The table wants the values of the various quantities at the times when the argument of the cosine function in $x'(t)$ equals 0, $\pi/4$, etc. Again explain your calculations.

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Experiment V and VI:

Expt. V: Do procedures and questions 1-6 and record your data, plots, tables, and calculations below. For item six it will be sufficient to directly compare your experimental data against the expect curve: Maximum displacement = $C \exp(-R/2m)t$ using the value of R (found in step 5) and an appropriate value of C. Please use complete sentences. Again explain your calculations.

Expt. VI: There is only one set of experiment VI, your TA should be able to give you a demonstration of resonance. Include a few sentences describing your observations.