# Homework No. 10 (Fall 2020) <br> PHYS 203A: COLLEGE PHYSICS <br> Department of Physics, Southern Illinois University-Carbondale <br> Due date: Thursday, 2020 Dec 3, 12:30pm, on D2L 

## Instructions

- Describe your thought process in detail and organize it clearly. Make sure your answer has the correct units and the right number of significant digits.
- After completion, scan the pages as a single PDF file, and submit the file on D2L (Assessments $\rightarrow$ Assignments).


## Questions

1. ( $\mathbf{1 0}$ points.) A spring ( $k=1500 \mathrm{~N} / \mathrm{m}$ ) is hanging from the ceiling of an elevator, and a 10.0 kg object is attached to the lower end of the spring. By how much does the spring stretch (relative to its unstrained length) when the elevator is speeding while moving upwards at $1.00 \mathrm{~m} / \mathrm{s}^{2}$.
2. (10 points.) An object attached to a horizontal spring is oscillating back and forth along a frictionless surface. The maximum speed of the object is $1.25 \mathrm{~m} / \mathrm{s}$, and its maximum acceleration is $7.50 \mathrm{~m} / \mathrm{s}^{2}$. How much time elapses between an instant when the object's speed is at maximum and the next instant when its acceleration is at a maximum?
3. ( $\mathbf{1 0}$ points.) Astronauts on a distant planet set up a simple pendulum of length 1.0 m . The pendulum executes simple harmonic motion and makes 100 complete oscillations in 280 s . What is the magnitude of the acceleration due to gravity on this planet?
4. (10 points.) A physical pendulum (which should not be confused for a simple pendulum) is made from a meter stick that is suspended from the ceiling at one end. (The moment of inertia of rod of length $L$ and mass $M$ about an axis passing through its end and perpendicular to the rod is $I=\frac{1}{3} M L^{2}$.) Determine the time-period of the oscillations executed by this pendulum on Earth.
