Please answer the questions below to the best of your ability either in the space provided. Everything should be scanned or photographed and submitted through gradescope.com. Whether you do the work on this page or on your own paper, please make sure to assign each page to the correct part of the problem after uploading it to gradescope!

Objective: *I can utilize spring and gravitational forces to investigate future motion.*

1. Shipping fuel into space in expensive. Come the time when humans return to the Moon, NASA wants to prep a new launching mechanism to get astronauts off the surface of the Moon and back to Earth. Their genius idea is to ship a large spring to the Moon and use that to launch future ships back towards Earth. The empty weight of the Apollo ascent module was about 2500 kg, so we'll say NASA's new ships will be of a similar mass. The Moon has a mass of 7.348×10^{22} kg and an average radius of 1737 km.

(3) (a) Do to shipping considerations, NASA can not send an arbitrarily large spring to the Moon. The spring they decide on can only be stretched or compressed by a maximum of 2 m. To ensure that the spring has plenty of room to compress even when the ship is loaded and stationary atop it (which will compress it slightly), they want the ship itself to only compress the spring by 5% of this maximum amount. What is the minimum value of spring constant that will work for their spring?

(7) (b) A ship must be traveling at 2.38 km/s to escape the gravitational pull of the Moon. If the spring is compressed the maximum amount with the ship atop it and then released, will the ship be traveling fast enough when it leaves the spring? You can use $\Delta t = 0.1\,\text{s}$. Make sure to support your answer!

Yeah, this plan is absolute rubbish...