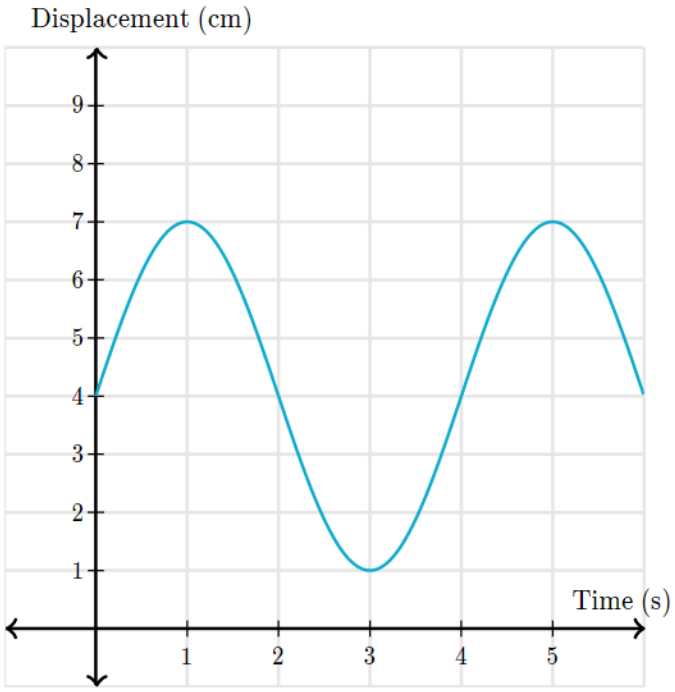
Problem Set 4
Physics, summer 2020/21

1) **(4p.)** A student extends then releases a mass attached to a spring. A graph of the mass's displacement over time is shown below.



a) What is the period, frequency and amplitude of the oscillation?
b) What is the average speed and velocity between 2s and 5s?

2) **(2p.)** Find the acceleration due to Earth's gravity at the distance of the Moon. The radius of the Moon's nearly circular orbit is 3.84×10^{8}m, and mass of Earth is equal 5.98×10^{24}kg.

3) **(3p.)** Calculate the centripetal acceleration needed to keep the Moon in its orbit (assuming a circular orbit about a fixed Earth), and compare it with the value of the acceleration due to Earth's gravity that you have just found. Assume that the period (the time it takes to make one complete rotation) of the Moon's orbit is 27.3 days. Remember formulas from previous classes (rotational motion).

4) **(1p.)** A planet moves around the sun in an elliptical orbit with the sun at one of its foci. The physical quantity associated with the motion of the planet that remains constant with time is? Choose an answer and comment that choice.
a) velocity
b) centripetal force
c) linear momentum
d) angular momentum

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