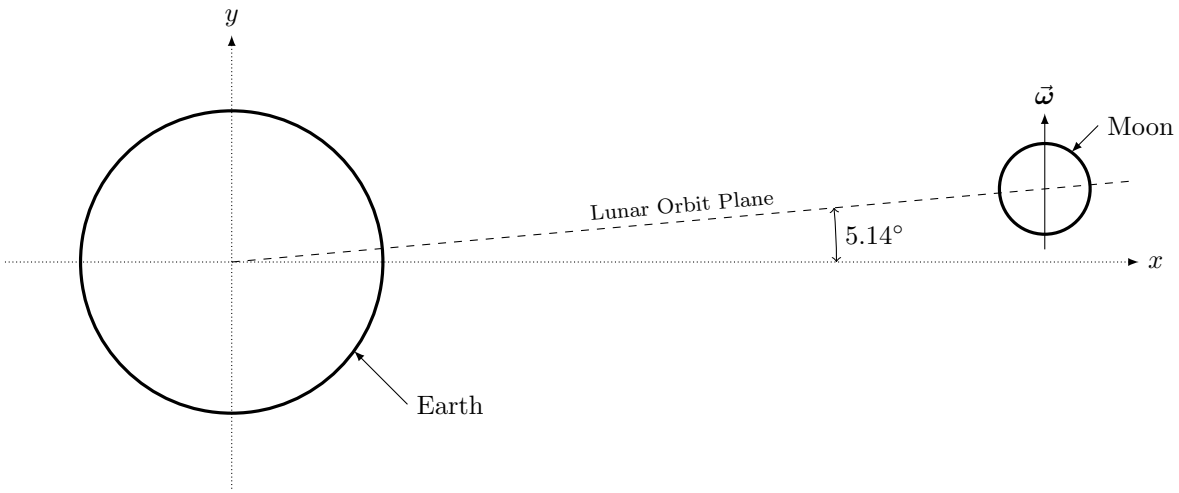
Please answer the questions below to the best of your ability either in the space provided. Everything should be scanned or photographed and submitted through gradescope.com.

Objective: *I can calculate the total angular momentum of a system, taking into account both translational and rotational contributions.*

1. The Moon always faces the same side toward Earth due to a process called tidal-locking. The result is that the Moon rotates once about its axis in the same amount of time it takes it to rotate once around the Earth: 27.321 d. Complicating the issue is that the Moon's orbital path is tilted relative to the Earth. The image below hopefully helps understand the approximate layout, though the distances are not to scale! The Moon's orbit is approximately circular with a Earth–Moon distance of 385,000 km and the Moon has a mass of 7.342×10^{22} kg and a radius of 1737 km.



   (a) What is the translational angular momentum of the Moon's orbit about the Earth? You'll likely want to do this in component form, as the right-hand-rule won't give you an obvious direction (it would be a combination of x and y). At the point when the image was drawn, the Moon is moving into the paper (in the negative-z direction).

(b) What is the rotational angular momentum of the Moon about its axis of rotation ($\vec{\omega}$)? You can assume the Moon is a solid sphere.

(c) What is the total angular momentum of the Moon as it orbits the Earth?