Rotation Homework Problems:
p. 92: #37, 38, 39, 42, 43

Problems taken from the school's old textbook:
Giancoli, D. (1980). *Physics*, 2nd Ed. Englewood Cliffs, NJ: Prentice Hall.

Some helpful numbers and constants:

- $G = 6.67 \times 10^{-11}\ N(m^2/kg^2)$
- Radius of the earth: 6.38×10^6 meters
- Radius of the moon: 1.7×10^6 meters
- Mean earth-sun distance: 1.50×10^{11} meters
- Mass of the earth: 5.98×10^{24} kg
- Mass of the moon: 7.4×10^{22} kg

37. A 15.0-kg monkey hangs from a cord suspended from the ceiling of an elevator. The cord can withstand a tension of 185 N, and breaks as the elevator accelerates upwards. What was the elevator's minimum acceleration (magnitude and direction)?

38. Calculate the speed of a satellite moving in a stable circular orbit about the earth at a height of 3200 km.

39. One of the moons of Jupiter discovered by Galileo has a rotational period of 1.44×10^6 seconds and its average distance from the center of Jupiter is 1.9×10^9 m. Using these facts, determine the mass of Jupiter.

42. At what height above the earth's surface must a satellite be placed if it is to remain over the same geographical point on the equator of the earth?

43. What is the apparent weight (include an indication of direction) of a 65-kg astronaut 4200 km from the center of the earth's moon in a space vehicle
   a) moving at constant velocity
   b) accelerating toward the moon at 3.6 m/s^2.

ANSWERS:

37. 2.53 m/s^2 upward
38. 6451 m/s
39. 1.96×10^{27} kg
42. 3.59×10^4 km
43a. 18.2 N, towards the moon
43b. 215.8 N away from the moon