4.1

- Newton's Law of gravity has many useful derivations
- The average distance from the earth to the sun is 1AU, or 1.5*10^11 meters
- All planets orbit the sun
- T^2/a^3 is a constant

4.2

- Orbital trajectory for a body reduced by mu is in polar coordinates
- L is angular momentum
- L is conserved because the system is invariant under motion
- F(r) is the force equations that contains G, mass of the sun and the planet, and the r
- Beta creates and elliptical orbit, when beta is 3 the orbit is chaotic, when beta approaches 2 it becomes more and more stable

4.3

- Equation 4.13. The force law predicted by general relativity
- Mercury's orbit is oval shape rather than more circular
- Angular momentum at point 1 is equal to that at point 2. Equation 4.15

4.4

- Jupiter affects all the planets the most because of its size besides Earth, which is only affected by the sun
- When the mass was multiplied by 1000 it flung earth out of its orbit off into space