Advanced Mechanics
Problem set #3

1: The Evil Physics Monkey builds a helical emergency slide. Derive the Hamiltonian equations of motion for the monkey that is constrained to the spiral $z = c\theta$. r is fixed at R.

a: Find the Lagrangian and Hamiltonian for this system.
b: Compute Lagrange's Equations of motion.
c: Compute Hamilton's Equations of motion.

2: Consider a monkey of mass M that may or may not be in motion around a gravitational body that exerts a radial inward force $\vec{F}_r = -\frac{GMm}{r^2}\hat{r}$. For simplicity, reduce -*GMm* to a constant 'g'. In polar coordinates:

a: Find the Lagrangian and Hamiltonian for this system.
b: Compute Lagrange's Equations of motion.
c: Compute Hamilton's Equations of motion.