

HW#3

- ① goldstein Ch. 3, Deriv. 3
- ② goldstein Ch. 3, Ex. 3.14
- ③ goldstein Ch. 3, Ex. 20 a, b
- ④ Consider motion of a particle of mass m in $V(r) = -\frac{\alpha}{r^2}$, $\alpha > 0$.

- (a) Find the orbit equation $r(\theta)$ for
- $\downarrow$ total energy $\downarrow$ angular momentum
- $$\left\{ \begin{array}{ll} E > 0, & \ell^2 > 2m\alpha \\ E > 0, & \ell^2 < 2m\alpha \\ E < 0, & \ell^2 < 2m\alpha \end{array} \right.$$

Discuss the resulting orbits qualitatively.

- (b) Find the dependence of time on distance, $t(r)$.

Hint: it is the same in all 3 cases.