1. Shankar, Read Ch 5. I’ll assign some exercises shortly - stay tuned.

2. Reproduce the first three equations in the WKB approximation (ie the geometrical optics, short-wavelength approximation) quoted in lecture (from Borowitz), beginning with

$$\phi(r) \equiv A(k_0, r) \exp(ik_0S(r)),$$

where the amplitude $A$ can be expanded in a series in $1/k_0$, and the phase $S$ is taken to be simply of order zero (ie independent of $k_0$).

3. Rederive the first two equations in the WKB approximation for the wave equation, beginning with

$$\phi(r) \equiv \exp(ik_0S(k_0, r)),$$

but assuming that $S$ can be complex and can be expanded in a series in $1/k_0$. (You’ll effectively be absorbing the amplitude into $S$.) Show that the equations are equivalent to those in the previous case by identifying terms in $A$ above with those in $S$ here.