1. **Phase differences in soap bubble and Michelson interferometer:** A light beam with wavelength $\lambda_0$ is incident from a semi-infinite medium with refractive index $n\,'$ at angle $\theta\,'$ onto a slab with refractive index $n$ and thickness $d$. The refracting angle inside the slab is $\theta$. The other side of the slab is also a semi-infinite medium with $n\,'$. The two surfaces of the slab are parallel. Derive the total phase difference between the reflected beam from the front surface and the reflected beam from the rear surface of the slab.