MA1E01: Tutorial week 8

REMEMBER TO HAND BEFORE THE TUTORIAL STARTS

- Maximum minimum problems

Problem 1 *Light travels at different speeds in different mediums (i.e. the light traveling trough water is $\approx 25\%$ slower than in air). When light changes from one medium to another, it "bends" (this is called refraction), according to the Snell law (see figure 1)*

$$v_2 \sin\theta_1 = v_1 \sin\theta_2$$

Prove that Snell law is a result of the fact that light travels following a path that requires ***minimum time****. In other words, imagine that a ray of light wants to go from A to B (see figure 1). Show that the path that minimizes the time of travel obeys Snell Law.*

*(**Bonus question:** How the hell does light know the path of minimum time?? If this still does not surprise you, have a look at this: https://phys.org/news/2013-04-ants-fermat-principle.html)*

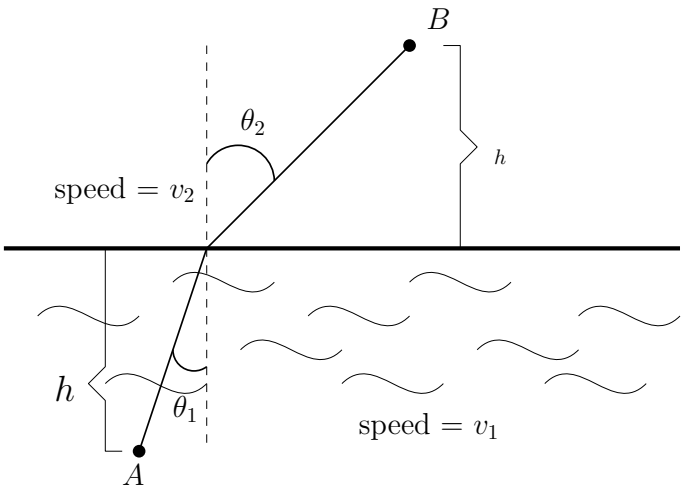

Figure 1: Light travelling from A to B uses the path that minimizes the travel time.