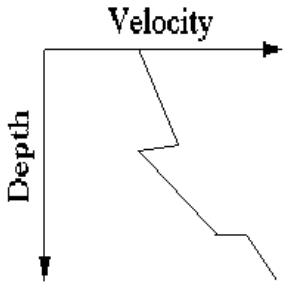
SIO 103 – PROBLEM SHEET 2

Problem 2 .1 Define the following terms: a) slowness; b) ray parameter; c) epicentral distance; d) delay time; e) turning point; f) triplication; g) shadow zone

Problem 2 .2 For the following velocity structure, sketch $T(X)$, $X(p)$, and $\tau(p)$ where T is travel time, X is distance, τ is the delay time and p is ray parameter. (It might also help to sketch a ray diagram too.)



Problem 2 .3 An Earth model consists of a layer over a half-space. The layer velocity is 5 km/s, the half-space velocity is 8 km/s and the layer thickness is 25 km. Sketch a travel time curve for the model (assuming a surface source) and mark on it the head wave, the direct wave, the post-critical reflection and the pre-critical reflection.

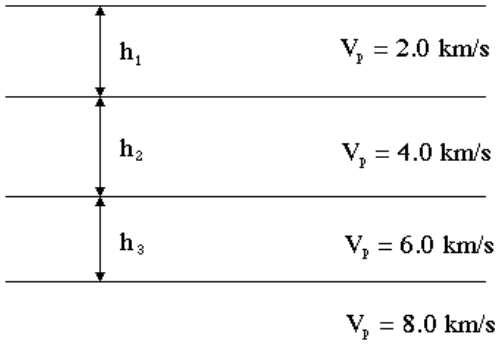
a) Compute $\tau(p)$ for the head wave and direct wave.
b) At what distance and time does the head wave start?
c) At what distance and time does the first arrival become the head wave rather than the direct wave?
d) At what time does the pre-critical reflection intercept the T axis and what value of p does this correspond to?

Problem 2 .4 Sketch a cross section of the Earth showing the inner core, outer core, and mantle. Plot the following rays on your sketch: $PPS, pPS, P'P', PcP, SKKS, PKJKS, PKiKP$ (remember $P' \equiv PKP$).

Problem 2 .5 Given the following $\tau(p)$ data

p (s km^{-1})	τ (secs)
.32	2.3051
.19	3.4249
.13	4.5854

and the following model:



Determine the layer thicknesses h_1, h_2, and h_3.