

Homework #2 Solution      Yellow Submarine problem

$$\alpha = 0.02 \text{ dB/km, or } 0.00002 \text{ dB/m}$$

we are told that  $SE = SL + DI - DT - N - TL$  defines the problem

we need to determine where  $SE = 0$ , which occurs when  $TL = -82 \text{ dB}$

$0 < R < 1000 \text{ m}$       spherical spreading

$$TL = -20\log_{10}R - 20\alpha R$$

$R > 1000 \text{ m}$       cylindrical spreading plus loss to spherical spreading in 1<sup>st</sup> 1000 m

$$TL = -10\log_{10}R - 20\alpha R - 30$$

(since I didn't define the ocean very well, I accepted both the definition of TL above and completely spherical spreading, which would ensue for an infinitely deep fluid)

