1 Power from the Ocean

It has been proposed to use the thermal gradient of the ocean to drive a heat engine. Suppose that at a certain location the water temperature is 22°C at the ocean surface and 4^oC at the ocean floor.

(a) What is the maximum possible efficiency of an engine operating between these two temperatures?

(b) If the engine is to produce 1 GW of electrical power, what minimum volume of water must be processed every second? Note that the specific heat capacity of water $c_p = 4.2$ $\mathrm{Jg^{-1}K^{-1}}$ and the density of water is 1 g $\mathrm{cm^{-3}}$, and both are roughly constant over this temperature range.