HW5, PP2

A solar collector is used to heat water.

(a) Form the energy balance over the system piece by piece

Incoming heat fluxes:

Solar irradiation
Radiation from the sky

Outgoing heat fluxes:

Convection from the surface
Radiation to the sky

The sum of these is the heat flux that can be used for heating the water

(b) The efficiency is the ratio of the useful heat flux to the solar irradiation

(c) the heating of the water is

$$q = mc_p(T_o - T_i)$$

From which the flow rate can be calculated

Correct answers:

(a): ~560W/m2

(b): ~60%

(c): ~0.4 L/min