Chapter 16:

How much heat is lost by a man with skin area 1.3 m^2 in a 22° room, if his skin temperature is 33° and he is a good emitter ($\epsilon = 1$)?

Answer: $\mathcal{P} = 88$ Watts. [He would also typically lose 10 W by a combination of conduction and convection, and about 20 Watts by perspiration (skin evaporation).]

A copper plate 0.2 m by 0.3 m is 25 mm thick. If one side is at 150° and the other at 55°, at what rate does heat flow through the plate? For Cu, $k = 385$ W/(mK).

Answer: About 87,800 Watts.

Just based on the heat received from the sun, if this heat were immediately re-radiated to outer space, what should be the average (day-night, year-round) surface temperature of the earth? The sun provides an average of 1366 W/m^2 at earth's orbit, and the earth reflects 30% of this back into space.

Answer: 255 K. The actual average temperature is 288 K or 15° C, far from −18° C!

A block of metal with specific heat 100 J/(kg-K) is dumped into a liquid with a specific heat of 400 J/(kg-K). The metal was at 300 K and the liquid at 280 K. If no heat is gained or lost by the system, and the equilibrium temperature turns out to be 290 K, what was the ratio of the mass of the metal to the mass of the liquid?

Answer: $M_m = 4M_L$.