Problem 65

A floating-point operation is a single arithmetic operation such as addition, subtraction, multiplication, or division. (a) Estimate the maximum number of floating-point operations a human being could possibly perform in a lifetime. (b) How long would it take a supercomputer to perform that many floating-point operations?

Solution

From page 10,

$$10^9 \text{ s} = \text{human lifetime}$$

$$10^{-17} \text{ s} = \text{time for a single floating-point operation in a supercomputer.}$$

Assume that it takes one second for a human to do one floating-point operation.

$$\#\text{ of operations a human can do} = \frac{\text{human lifetime}}{\text{time for human to do one operation}} = \frac{10^9 \text{ s}}{1 \text{ s}} = 10^9$$

The time it takes for a supercomputer to do this number of operations is

$$10^9 \cancel{\text{operations}} \times \frac{10^{-17} \text{ s}}{1 \cancel{\text{operation}}} = 10^{-8} \text{ s}.$$