

Keeper 6.5 Virtual Problems – Total and Net Change

At time $t = 0$, there are 120 pounds of sand in a conical tank. Sand is being added to the tank at a rate of $s(t) = 2e^{\sin^2 t} + 2$ pounds per hour. Sand from the tank is used at a rate of $R(t) = 5 \sin^2 t + 3\sqrt{t}$ per hour. The tank can hold a maximum of 200 pounds of sand.

1. Find the value of $\int_0^4 S(t) dt$. Using correct units, what does this value represent?

2. Find the value of $\int_1^3 R(t) dt$. Using correct units, what does this value represent?

3. Find the value of $\frac{1}{4} \int_0^4 S(t) dt$. Using correct units, what does this value represent?

4. Write a function, $A(t)$, containing an integral expression that represents the amount of sand in the tank at any given time, t .

5. How many pounds of sand are in the tank at time $t = 7$?

6. After time $t = 7$, sand is not used any more. Sand is, however, added until the tank is full. If k represents the value of t at which the tank is at maximum capacity, write, but do not solve, an equation using an integral expression to find how many hours it will take before the tank is completely full of sand.

