AB CalcLog 5.1

Methane is produced in a cave at the rate of $f(t) = e^{\sin\left(\frac{\pi}{4}t\right)}$ liters per hour at time t hours. The initial amount of methane in the cave at time $t = 0$ is 20 liters. At time $t = 8$ hours, a pump begins to remove the methane at a constant rate of 1.5 liters per hour.

1. At what time t during the time interval [0, 8] hours is the amount of methane increasing the most rapidly?

2. Write an equation to represent the total amount of methane present in the cave at time t. What is the total amount of methane in the cave at time $t = 8$ hours?

3. What is the average rate of methane accumulation in the cave over the time interval [0,24] hours?

4. What is the absolute maximum amount of methane in the cave over the time interval [0,24] hours?