

2003 AP[®] CALCULUS AB FREE-RESPONSE QUESTIONS (Form B)

2. A tank contains 125 gallons of heating oil at time $t = 0$. During the time interval $0 \leq t \leq 12$ hours, heating oil is pumped into the tank at the rate

$$H(t) = 2 + \frac{10}{(1 + \ln(t + 1))} \text{ gallons per hour.}$$

During the same time interval, heating oil is removed from the tank at the rate

$$R(t) = 12 \sin\left(\frac{t^2}{47}\right) \text{ gallons per hour.}$$

- (a) How many gallons of heating oil are pumped into the tank during the time interval $0 \leq t \leq 12$ hours?
 - (b) Is the level of heating oil in the tank rising or falling at time $t = 6$ hours? Give a reason for your answer.
 - (c) How many gallons of heating oil are in the tank at time $t = 12$ hours?
 - (d) At what time t , for $0 \leq t \leq 12$, is the volume of heating oil in the tank the least? Show the analysis that leads to your conclusion.
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