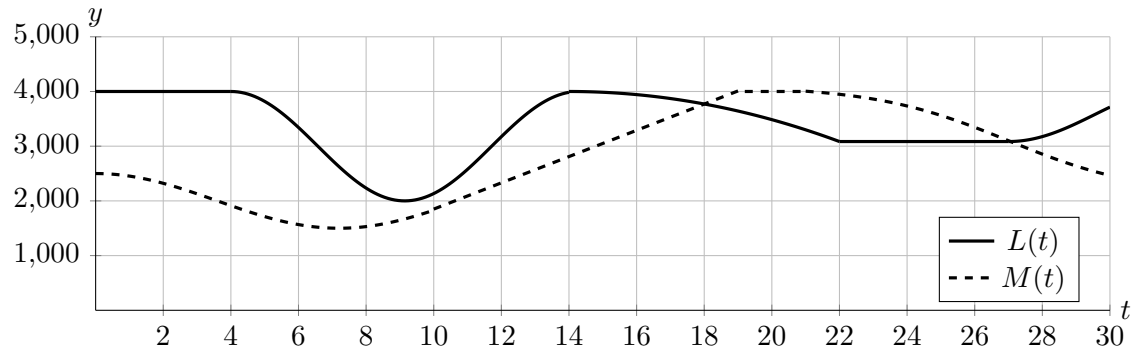
9. [9 points] James is running a juice factory, and is examining some production and sales numbers from 2025. In the month of November, the factory produced juice at a rate of $L(t)$ gallons per day, and sold juice at a rate of $M(t)$ gallons per day, t days after midnight on November 1st. Any surplus juice that was produced but not yet sold was stocked in a refrigerator, and the refrigerators contained 1,200 gallons of juice at midnight on November 1.

Graphs of the continuous functions $L(t)$ and $M(t)$ are shown below.



a. [2 points] Write a sentence, including units, that gives a practical interpretation of the equation

$$\int_0^{30} L(t)\,dt = 101{,}726.$$

Solution: The factory produced a total of 101,726 gallons of juice during November 2025.

b. [1 point] At what t value was the stock of refrigerated juice at the factory decreasing the fastest?

Answer: $t =$ 22

c. [1 point] At what t value was the stock of refrigerated juice at the factory greatest?

Answer: $t =$ 18

d. [2 points] Write an expression for the total number of gallons of refrigerated juice in stock at the factory at the end of November.

Answer: $1200 + \int_0^{30} \big(L(t) - M(t)\big)\,dt$

e. [2 points] Write an expression for the *change* in the number of gallons of refrigerated juice in the factory between $t = 4$ and $t = 8$.

Answer: $\int_4^8 \big(L(t) - M(t)\big)\,dt$

f. [1 point] Given that the average amount of juice sold per month by the factory in 2025 was 97,500 gallons, complete the statement below by writing $>$, $<$, or $=$ in the blank.

The amount of juice sold in Nov. 2025 was $<$ the average amount sold per month in 2025.

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