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The secant line between point $(-2, M(-2))$ and point $(12, M(12))$ is given by $y = y_1 + \left(\frac{M(12) - M(-2)}{12 - (-2)} \right)(x - x_1)$, where (x_1, y_1) can be either one of the points.

Using $(12, M(12))$, an estimate using the average rate of change is given by $y = M(12) + r(x - 12)$.

For $x = 20$,

$$y = 517.50 + r(20 - 12) = 527.50.$$

The amount of money the student has when $t = 20$ was approximately **527.50** dollars.

(iii) The estimate $A(t)$ is the y -coordinate of a point on the secant line that passes through $(-2, M(-2))$ and $(12, M(12))$. Because the graph of M is concave up for $t \geq 0$ (and constant for $t < 0$), this line is below the graph of M for $t > 12$. Therefore, the estimate using the average rate of change $A(t)$ is less than the value of $M(t)$ for $t > 12$. The error, which is the difference between the estimate and the value of $M(t)$, is increasing as t increases because M is exponential and its graph is concave up.

Part C

Select a point value to view scoring criteria, solutions, and/or examples to score the response.



0

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The student response includes this criterion.

- Answer with reason based on use of the displayed exponential $M(t)$ from Part A

Model Solution

\$565 is the desired amount of money in the account. The account will be closed at time t_C months when $M(t_C) = 565$. Therefore, the domain of M is limited to $-10 \leq t \leq t_C$ months. (In this situation, $t_C = 42.632$.)

t	0	35	45
Number of Cones	14	57	46

The table gives the number of ice cream cones sold by a food vendor. On the initial day ($t = 0$) when the vendor added ice cream cones to the menu, the vendor sold **14** ice cream cones. Thirty-five days later ($t = 35$), the vendor sold **57** ice cream cones. Ten days after that ($t = 45$), the vendor sold **46** ice cream cones.

The number of ice cream cones sold can be modeled by the quadratic function I given by $I(t) = at^2 + bt + c$, where $I(t)$ is the number of ice cream cones sold on day t .