

2. On the initial day of sales ($t = 0$) for a new video game, there were 40 thousand units of the game sold that day. Ninety-one days later ($t = 91$), there were 76 thousand units of the game sold that day.

The number of units of the video game sold on a given day can be modeled by the function G given by $G(t) = a + b \ln(t + 1)$, where $G(t)$ is the number of units sold, in thousands, on day t since the initial day of sales.

- (A) (i) Use the given data to write two equations that can be used to find the values for constants a and b in the expression for $G(t)$.
- (ii) Find the values for a and b as decimal approximations.
- (B) (i) Use the given data to find the average rate of change of the number of units of the video game sold, in thousands per day, from $t = 0$ to $t = 91$ days. Express your answer as a decimal approximation. Show the computations that lead to your answer.
- (ii) Use the average rate of change found in (i) to estimate the number of units of the video game sold, in thousands, on day $t = 50$. Show the work that leads to your answer.
- (iii) Let A_t represent the estimate of the number of units of the video game sold, in thousands, using the average rate of change found in (i). For A_{50} , found in (ii), it can be shown that $A_{50} < G(50)$. Explain why, in general, $A_t < G(t)$ for all t , where $0 < t < 91$.
- (C) The makers of the video game reported that daily sales of the video game decreased each day after $t = 91$. Explain why the error in the model G increases after $t = 91$.

Write your responses to this question only on the designated pages in the separate Free Response booklet. Write your solution to each part in the space provided for that part.

END OF PART A

Name:

AP Precalculus: **2024**

PRECALCULUS
SECTION II, Part B
Time—30 minutes
2 Questions

NO CALCULATOR IS ALLOWED FOR THESE QUESTIONS.