Warm Up

Determine each function's average rate of change for the interval (0, 2).

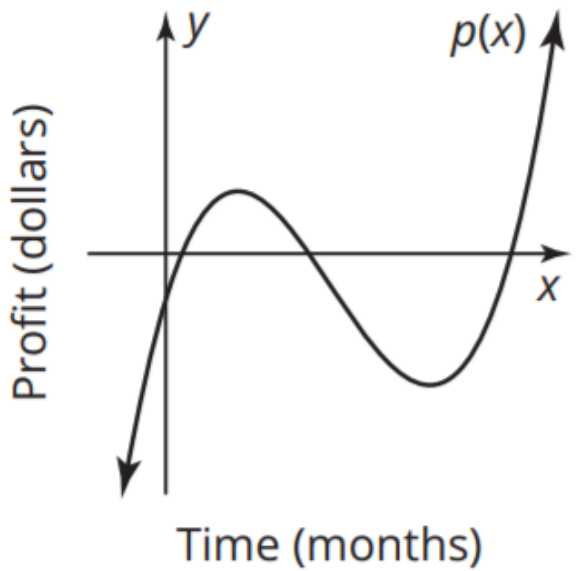
1. $f(x) = \frac{1}{2}x$

2. $g(x) = 3x^2$

3. $h(x) = 2^x$

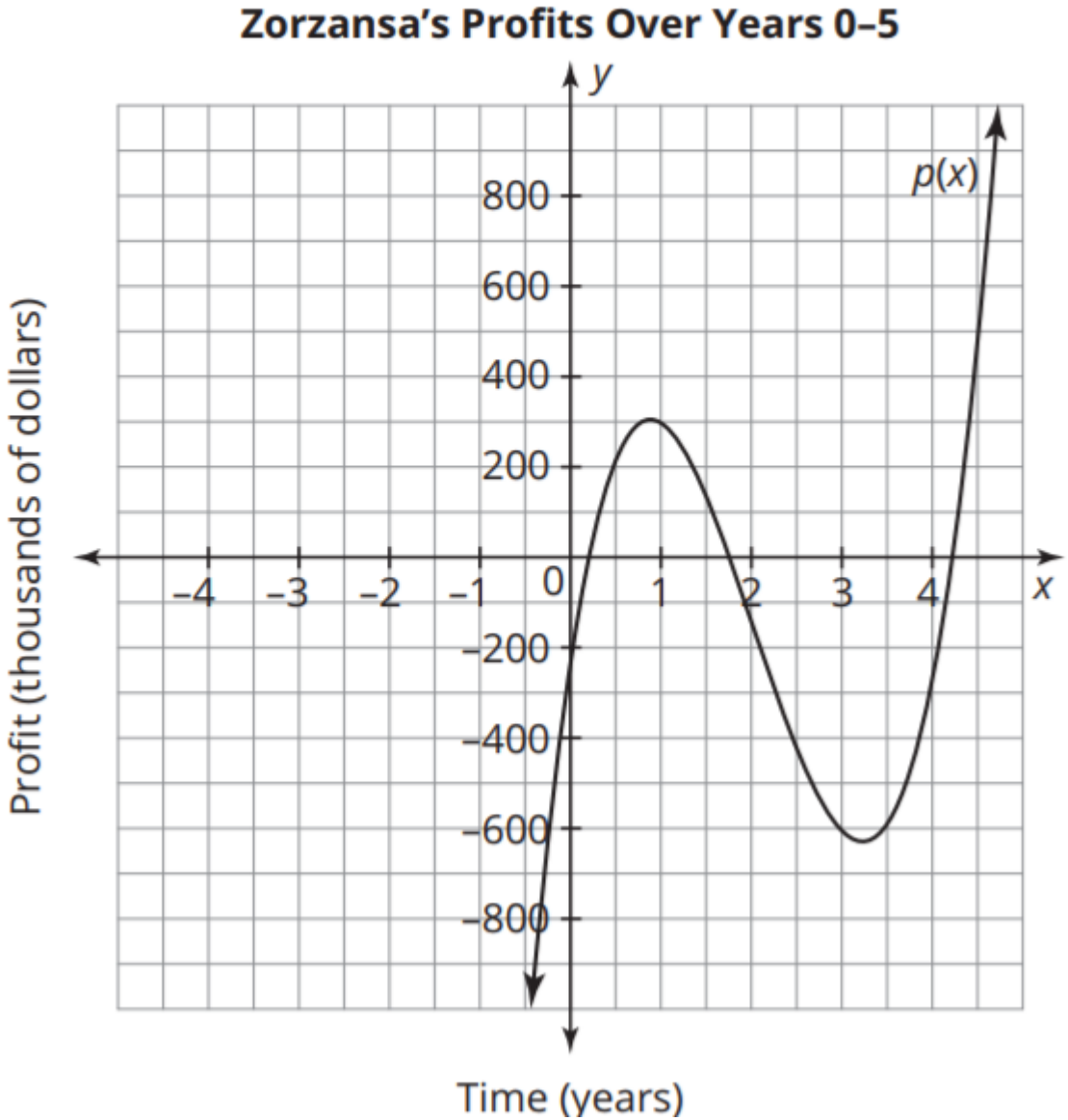
The polynomial function $p(x)$ models the profits of Zorzansa, a video game company, from its original business plan through its first few years in business.

Zorzansa's Profits



1. **Label the portion(s) of the graph that model each of the memorable events in the company's history by writing the letter directly on the graph. Explain your reasoning.**

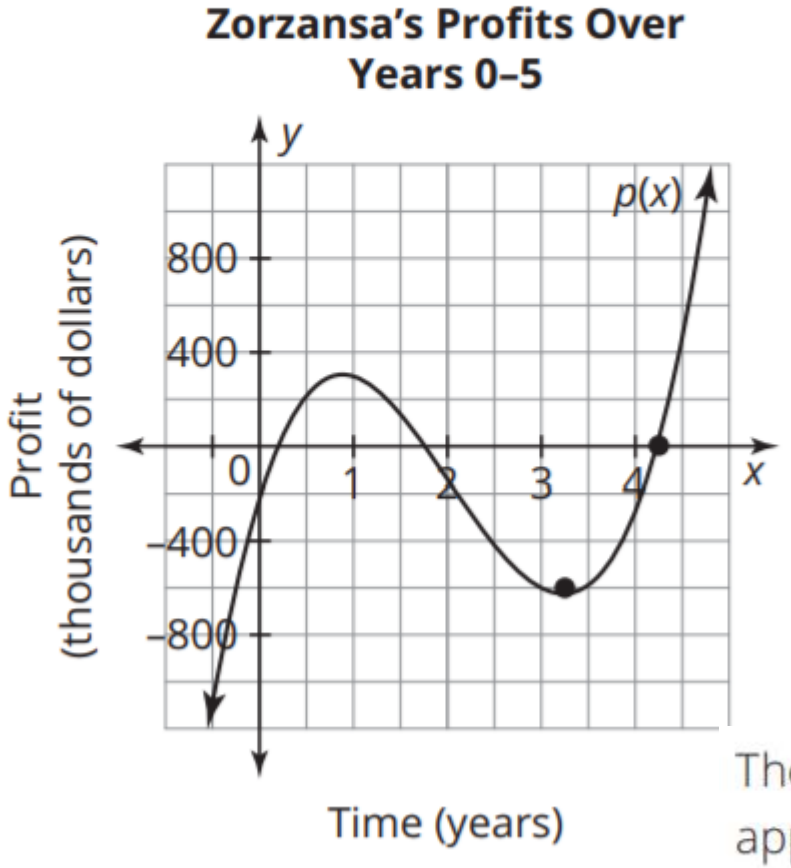
The cubic function $p(x)$ models Zorzansa's total profits over the first five years of business.



The **average rate of change** of a function is the ratio of the change in the dependent variable to the change in the independent variable over a specific interval. The formula for average rate of change is $\frac{f(b) - f(a)}{b - a}$ for the interval (a, b). The expression $b - a$ represents the change in the input values of the function f. The expression $f(b) - f(a)$ represents the change in the output values of the function f as the input values change from a to b.

Worked Example

You can determine the average rate of change of Zorzansa's profit for the time interval (3.25, 4.25).



$$\frac{f(b) - f(a)}{b - a} = \frac{f(4.25) - f(3.25)}{4.25 - 3.25}$$

$$= \frac{0 - (-600)}{1}$$

$$= \frac{600}{1} = 600$$

The average rate of change for the time interval (3.25, 4.25) is approximately \$600,000 per year.