

Name: _____

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1. [**3 parts, 1 point each**] An economist is interested in how the price of a certain item affects its sales. At a price of p dollars, a quantity $q = f(p)$ of the item is sold.

(a) Interpret in English: $f(120) = 7200$.

(b) Interpret in English: $f'(120) = -50$.

(c) Using the given information, estimate $f(118)$.

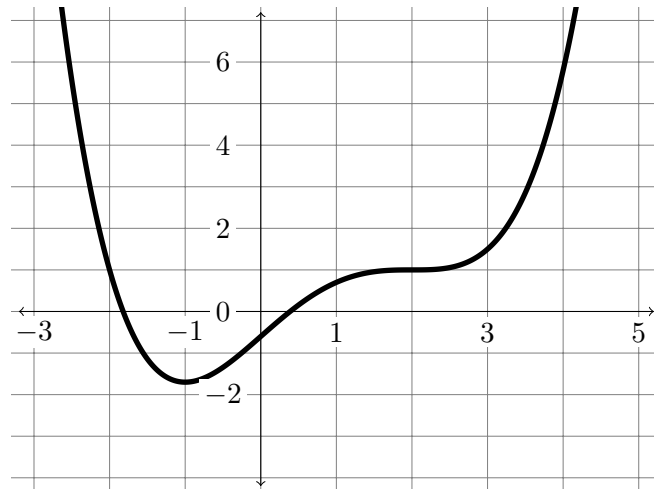
2. [**3 parts, 1 point each**] Let $P(t)$ be the world's population (in billions of people) t years after 2000.

(a) Translate the following two sentences into mathematical equations. In 2005, the world's population was 6.51 billion. In 2010, the world's population was 6.91 billion.

(b) Based on the information given, estimate $f'(5)$. Include units.

(c) Compute the relative rate of change in the world's population at $t = 5$. Include units and explain what this value means in terms of the world's population.

3. [2 parts, 2 points each] The graph of a function $f(x)$ appears below.



- (a) Estimate the intervals on which the derivative of f is positive and the intervals on which the derivative of f is negative.
- (b) Estimate the intervals on which the second derivative of f is positive and the intervals on which the second derivative of f is negative.