

Section 4.3

1) Use the model obtained in classroom example #2 from section 4.2 to find the year between 1980 and 1997 when the average price of natural gas was decreasing most rapidly. What was the rate of change of the average price in that year?

2) The table shows the percent of U.S. households that owned a microwave oven as a function of the year. (Source: Energy Information Administration)

Year	1978	1980	1982	1984	1987	1990	1993
Percent	8	14	21	34	61	79	84

a) Find a model for the data.

b) In what year is the percentage increasing most rapidly? Give the year, the percent, and the rate of change of percent.

Section 5.1

1) An office worker assembles advertising portfolios. As fatigues sets in the number of portfolios he can assemble per hour decreases. Using regression, it is determined that he can assemble $f(t) = 20 - t^2$ portfolios per hour t hours after he begins work. How many portfolios can he assemble in 3 hours?

2) Find the area under the graph of $f(x) = 20 - x^2$ and above the x-axis between $x=0$ and $x=3$.

3) The rate of change of the population of North Dakota between 1985 and 1996 can be modeled by $p(t) = \begin{cases} -7.35 \text{ thousand people per year when } 0 \leq t \leq 6 \\ 2.5 \text{ thousand people per year when } 6 < t \leq 11 \end{cases}$ where t represents the number of years since 1985. (Source: *Statistical Abstract*, 1998)

a) Sketch a graph of the rate-of-change function.

b) Find the area of the region between the graph of p and the horizontal axis from 0 to 6. Interpret your answer.

c) Find the area of the region between the graph of p and the horizontal axis from 6 to 11. Interpret your answer.

d) Was the population of North Dakota in 1996 greater or less than the population in 1985? By how much did the population change between 1985 and 1996?

e) What information would you need to determine the population of North Dakota in 1996?