Reading assignment 2

due on 2nd class of week 9 along with homework 3

Notice:
This is an optional reading assignment. The purpose and policies are similar to reading assignment 1.
In lecture, when we talk about maximization and minimization, our examples are only partially related to some practical problem, due to the time limit and also because we want to focus more on understanding the knowledge, idea and method. This reading assignment is to show you how a practical problem might look like. Remember, these problems are very similar to our examples, in the view of mathematics and in the sense of solving optimization, meaning, dont be afraid of their looking-scary. You just need to read through the problem, spend a few minutes to understand its "story", then go straight to finding solution ;)
Besides, these problem are actually pretty short.
CHOOSE ONE OF THE FOLLOWING THREE PROBLEMS. Again, only do ONE. You earn 5 points.

Problem 1: #32 page 250: BROADCASTING.
An all-news radio station has made a survey of the listening habits of local residents between the hours of 5:00 PM and midnight. The survey indicates that the percentage of the local adult population that is tuned in to the station x hours after 5:00 PM is

\[ f(x) = \frac{1}{8}(-2x^3 + 27x^2 - 108x + 240) \]

a. At what time between 5:00 PM and midnight are the most people (adult) listening to the station? What percentage of the population is listening at this time?
b. At what time between 5:00 PM and midnight are the fewest people listening? What percentage of the population is listening at this time?

Problem 2: #38 page 251: POLITICS.
A poll indicates that x months after a particular candidate for public office declares her candidacy, she will have the support of \( S(x) \) percent of the voters, where

\[ S(x) = \frac{1}{29}(-x^3 + 6x^2 + 63x + 1080) \]

for \( 0 \leq x \leq 12 \) (months)

If the election is held in November, when should the politician announce her candidacy?
Should she expect to win if she needs at least 50% of the vote?

Problem 3: #54 page 253: INCOME ELASTICITY OF DEMAND
Income elasticity of demand is defined to be the percentage change in quantity purchased divided by the percentage change in real income.
a. Write a formula for income elasticity of demand \( E \) in terms of real income \( I \) and quantity purchased \( Q \).
b. In the United States, which would you expect to be greater, the income elasticity of demand for cars or for food? Explain your reasoning.
c. What do you think is meant by a negative income elasticity of demand? Which of the
following goods would you expect to have $E < 0$: used clothing, personal computers, bus
tickets, refrigerators, used cars? Explain your reasoning.

$d$. Read an article on the income elasticity of demand and write a paragraph on why the
income elasticity of demand for food is much larger in a developing country than in a country
such as the United States or Japan.