



Course > Section 2: Economic Applications of Calculus: Elasticity and A Tale of Two Cities >  
 1.7 Summary Quiz - A little more about math and economics from Kiran Gajwani >  
 1.7.3 Summary and Additional Resources

## 1.7.3 Summary and Additional Resources

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Earlier in this section, we saw how elasticity helped us compare what happened in Boston and New York. We now also see that point price elasticity tells us exactly what to do to maximize revenue, if we have a continuous differentiable model of demand. Here's a summary:

- If  $R(p)$  has a maximum at some point, then  $R'(p) = 0$  and point price elasticity is  $-1$  at that point as well: a percent increase in price causes the exact same percent decrease in demand at that point. The converse is true as well.
- If demand is elastic, to increase revenue we should decrease prices. Why? Elastic means point price elasticity is greater than 1 in absolute value which means demand changes by a larger percent than the price changes. If we look at  $R'(p)$  at that point, we can show that  $|E| > 1$  implies that  $R'(p) < 0$ . So the revenue function is always decreasing, meaning to increase revenue we should decrease prices. (This is what happened in the example of  $q(p) = \frac{2000}{p^3}$ .)
- If demand is inelastic, to increase revenue we should increase prices. Why? Inelastic means point price elasticity is less than 1 in absolute value which means demand changes by a smaller percent than the price changes. If we look at  $R'(p)$  at that point, we can show that  $|E| < 1$  implies that  $R'(p) > 0$ . So the revenue function is always increasing, meaning to increase revenue we should increase prices.

Of course, there are more factors in the real world, as we've seen, and there are lots of other interesting questions to ask, both mathematically and economically. For example

- What types of functions  $q(p)$  have constant elasticity?
- How do we measure how price of one good affects demand for another (like how price of subway might affect demand for taxi or ride-sharing services)? This is called **cross-elasticity of demand**.
- Why might a business not want to maximize revenue?

### Additional Resources

Here are some resources (optional) to explore some of these. For more information about the Boston MBTA from historical times to today, and transportation in general, see also

- *A CHRONICLE OF THE BOSTON TRANSIT SYSTEM*, 1992 edition, By George M. Sanborn, Reference Librarian, State Transportation Library.
- Northeastern University Dukakis Center for Urban and Regional Policy  
<http://www.northeastern.edu/dukakiscenter/focus-areas/transportation/mbta/>
- Transportation Research Board, division of National Academies of Sciences, Engineering, and Medicine, Reports and Publications  
<http://www.trb.org/Publications/PubsTCRPPProjectReports.aspx>

For more about elasticity, see

- Price Elasticity from Khan Academy  
<https://www.khanacademy.org/economics-finance-domain/microeconomics/elasticity/tutorial>.

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