

Economic Functions Revisited
or
“More fun maximizing profit.”

Engagement Activity for Section 2.3 of Precalculus, Third Edition, Stitz and Zeager

Primary Section: 2.3

Secondary Sections: 1.5, 2.1

Key Concepts: Demand, cost, revenue and profit functions, vertex of a parabola, linear and quadratic functions

This activity is designed to help you more fully understand the concepts presented in Section 2.3 of the textbook. It is not a replacement for the regular homework, but rather, is a deeper investigation into the material presented in the section and how it is connected to other material presented in other sections. Your professor will have specific instructions as to how he/she wants the activity to fit into the class so please pay attention in class when this activity is assigned.

Edna makes ceramic Underpants Gnomes to sell at a local craft bazaar each week. The cost of her ceramic-making equipment is \$100 and the cost of supplies per gnome is \$15. If the selling price per gnome is \$50 then Edna will sell 28 gnomes per week but if she drops the price to \$45 per gnome then she will sell 32 of them per week.

1. Find the linear cost function $C(x)$ to produce x gnomes. Identify the fixed (or start-up) cost and the variable cost. (See p.159 of the text for definitions of those terms.) Find the applied domain of $C(x)$. That is, determine what values of x makes sense in this problem.
2. Find the linear price-demand function $p(x)$ where the selling price $p(x)$ per gnome is a function of x , the number of gnomes sold. (See p.82 of the text for the definition of this function.) Find the applied domain of $p(x)$. That is, determine what values of x makes sense in this problem.
3. Explain why it makes sense that the slope of the line for the cost function is positive. Asked another way, why should we expect the cost function to be an increasing function?

4. Explain why it makes sense that the slope of the line for the price-demand function is negative. Asked another way, why should we expect the price-demand function to be a decreasing function?
5. Find the revenue function $R(x)$ and the profit function $P(x)$. (See p.82 of the text for the definitions of these functions.) Determine the break-even point(s) and then find the value of x which maximizes the profit. What is that maximum profit?
6. At what price should Edna sell her gnomes in order to achieve the maximum profit? Explain how you got your answer.

After a three year hiatus, Yeti Software is releasing a new game, "Strike Team Ewigkeit: Assault on Castle Donnerwort", for the PortaBoy Game System. The cost of developing the game was \$50,000 (It's not a very good game.) and the cost to burn a DVD copy of it is \$1.50 per game. When priced at \$27.99 per game, 12,000 copies will be sold but if the price is raised to \$29.99 then only 11,500 copies can be sold.

- Find the linear cost function $C(x)$ to produce x copies of the game. Identify the fixed (or start-up) cost and the variable cost. (See p.159 of the text for definitions of those terms.) Find the applied domain of $C(x)$. That is, determine what values of x makes sense.
- Find the linear price-demand function $p(x)$ where the selling price $p(x)$ per game is a function of x , the number of games sold. (See p.82 of the text for the definition of this function.) Find the applied domain of $p(x)$. That is, determine what values of x makes sense.
- Explain why it makes sense that the slope of the line for the cost function is positive. Asked another way, why should we expect the cost function to be an increasing function?

10. Explain why it makes sense that the slope of the line for the price-demand function is negative. Asked another way, why should we expect the price-demand function to be a decreasing function?
11. Find the revenue function $R(x)$ and the profit function $P(x)$. (See p.82 of the text for the definitions of these functions.) Determine the break-even point(s) and then find the value of x which maximizes the profit. What is that maximum profit?
12. At what price should Yeti Software sell their game in order to achieve the maximum profit? Explain how you got your answer.

Student Questionnaire for Economic Functions Revisited

This Engagement Activity was created with one purpose in mind - to help you the student better understand the concepts presented in College Algebra. Whereas we think the activity does its job, the truth is that we need to know from you if it actually helped you learn. Please take a few minutes to complete this questionnaire anonymously and return it to your instructor. Your feedback will be used to improve the activity for next semester.

1. For Questions 1a through 1e below, please place an X in the box which most closely matches your opinion.

- (a) Before I began the activity, my understanding of the material was best described as

Clueless	Not so good	Meh	Pretty good	I pwned it!

- (b) After completing the activity, my understanding of the material is best described as

Clueless	Not so good	Meh	Pretty good	I pwn it!

- (c) The connection between the activity and the course material was clear

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

- (d) The activity's instructions were clear

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

- (e) The activity was a good use of class time

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

2. What did you like about the activity?

Continued on back →

3. How can we improve the activity?

4. Other comments: