

Warm-up

1. What is the domain of a function?
2. What is the range of a function?

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Let's start with some variables:

- p - The price we will sell the T-shirts at
- q - The quantity of shirts sold

First, we need to figure out how many shirts people would want. This is called the Demand. Instead of simply asking other students if they would want a shirt, you ask them how much they would pay for the t-shirt. From that data, we form a Demand function:

D: price p -----> # of shirts demanded at price p

$$D(p) = -(p - 20)(p + 20)$$

Graph the function for positive p . What do the intercepts mean?

Now, we need to figure out what the Revenue function is. The Revenue is the total money taken from sales, ignoring costs. We can generate the Revenue function from the Demand function. Can you figure out how?

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Revenue = (price per t-shirt) x (total shirts sold)

R: price p -----> Revenue at price p

$$R(p) =$$

Go ahead and graph this function for positive p . What do the intercepts mean?

An important part of t-shirt sales is figuring out how much it costs to make the t-shirts. A local shirt printing store offers to print t-shirts at \$4 each with a start-up cost of \$25. Write the cost of printing q t-shirts as a function of q .

C: quantity q -----> cost of making q t-shirts

$C(q) =$

We are concerned with profit, the difference of Revenue and Cost. Write the Revenue and Cost functions down again.

Do you notice a problem?

The inputs are different. Revenue is a function of price and Cost is a function of quantity. We need to have the same input to properly subtract the functions. How many shirts do we want to make?

Plug in the Demand function into the Cost function.

Now, we have Cost as a function of price.
Find the Profit function.

Graph the Profit function for positive price. What do the intercepts mean?

How much profit are we interested in?

Using your calculator, find the maximum of the Profit function. What does this point mean?