Name: ______________________________

MA162-020
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Quiz on 1.3: Functions

Let f be the function $f(x) = 3x + 4$. Fill in the table of values.

x	f(x)
0	
1	
2	
-5	
	10

A manufacturer has a monthly fixed cost of \$100,000 and a production cost of \$14 for each unit produced. The product sells for \$20 per unit.

What is the cost function? ________________________

What is the revenue function? ________________________

What is the profit function? ________________________

What is the profit (or loss) corresponding to production levels of 12,000 units? ____________

What is the profit (or loss) corresponding to production levels of 20,000 units? ____________

What is the production level corresponding to a profit of 0? ____________

Soybeans Part 1: When the price is \$2 per bushel the demand is 480 bushels. When the price goes up to \$12 per bushel the demand drops to 0 bushels. Assuming the demand function is linear, find the demand function. The table to the right names the demand d and the price p.

D	P

Demand equation: ________________________

Examples for 1.3: Cost, Revenue, Profit

Businesses must keep track of costs, revenue, and profit. In this chapter we use a very naive model with a single product being produced and sold, but also keeping track of **fixed costs** that must be paid no matter how many units of the product are produced. The business decision to be made is **how many units should be produced?** And for this we must calculate the **cost function**, **revenue function**, and **profit function**.

Suppose you rent a stall at the flea market for \$14/day and sell bracelets for \$3 each. Assuming the bracelets cost you \$1 each to make and that every bracelet you make is sold, how many bracelets do you need to make in order to break even?

$C = 14 + x$, $R = 3x$, $P = R - C = (3x) - (14 + x) = 2x - 14$ and if $P = 0$ then $2x = 14$, so $x = 7$ bracelets need to be made to break even.

Examples for 1.3: Supply and demand

The more people are willing to pay for a product, the more companies are willing to produce the product. If the price changes only a little, then the amount produced (or supplied) changes only a little, and the changes are related by a linear equation. Similarly, the higher the price, the less consumers are willing to buy, and if the price changes only a little, then the amount demanded by consumers changes only a little and the changes are related by a linear equation.

For instance, 48,000 alarm clocks are sold per month at \$8 each, but at \$12 each only 32,000 alarm clocks are sold. How many alarm clocks are sold at \$10 each?

P	D
\$8	48000
\$12	32000
\$10	?

Let P be the price and D be the number of alarm clocks demanded. We find the slope to be

$$(48000 - 32000)/(\$8 - \$12) = 16000/(-\$4) = -4000 \text{ (units change per dollar change).}$$

We use the point slope form to see $D - 48000 = -4000(P - \$8)$ which simplifies to

$$D = 80000 - 4000P.$$

When $P = \$10$, we get $D = 80000 - 4000(10) = 40000$, which of course is halfway between 48,000 and 32,000 just like \$10 is halfway between \$8 and \$12.

Linear depreciation:

Over short periods of time, an asset is depreciated (its value is decreased as far as accountants are concerned) according to a linear equation. If a microfilm scanner is worth \$80,000 new, but after two years is only worth \$40,000, then, assuming linear depreciation, how much was the scanner worth after one year?

t	V
0	80
2	40
1	?

We find the value obeys the equation $V = 80 - 20t$ in thousands of dollars where t is in years. Taking $t = 1$, we get \$60,000, which of course is halfway between \$80,000 and \$40,000 just like 1 year is halfway between 0 years and 2 years.