Math 1311
Section 2.1
Tables and Trends

The goal of this section is to use our calculator to create a table from a function given by a formula, and then analyze the table for trends and limiting values.

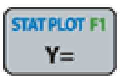
We can create a table by entering values of the variables and calculating the function values at given points one at a time, OR, we can let the calculator do the work.

We need to learn to let the calculator do the work!!

By constructing a table of values for a function (we will use the TI for this)

- We can find limiting values (we saw this earlier in chapter 1)
- We can estimate max/min values

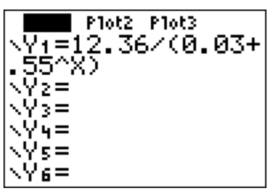
Skill #1: Entering a Function formula into the calculator

Press 

and enter the formula in Y_1.

Enter your function using the variable key for "x" not the letter key or the multiplication key!

Example 1:
Here is what it looks like when I enter the function $y = \frac{12.36}{0.03+0.55^x}$



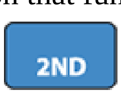
$Y_1 = y(x)$

Example 2:
Enter the function $N(t) = \frac{6.21}{0.035+0.45^t}$

$Y_2 = N(t)$
$x = t$

Skill #2 Creating a Table from a Function

Steps to Creating a Table

1. Enter the function into the Y= window.
2. Select the function you want to create a table for by positioning the cursor over the equals signs on that function.
3. Press 

to select how you want the table to look:

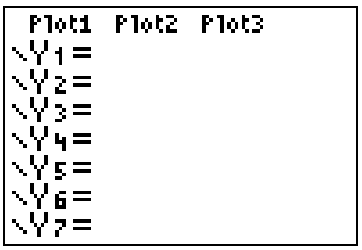
The TblStart = 0 means the first x value in the table will be 0. Put your cursor over the 0 and enter a different number if you want the table to start at a different value.

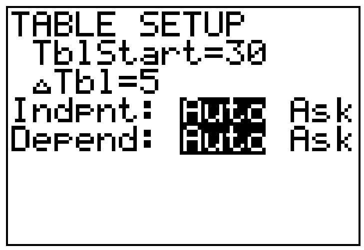
The ΔTbl = 5 means that each x entry in the table will be 5 units bigger than the last one. Put your cursor over the 5 and change this number if you want values at different intervals.

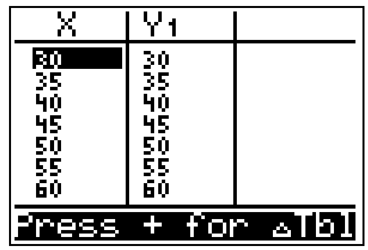
You can leave the AUTO settings on the last two lines for the moment.

4. Press  to see the table.

5. You can scroll up and down to see various values of the function.







Example 3: For the function $N(t) = \frac{6.21}{0.035+0.45^t}$

a. Create a table starting at 0 and increment by 1 each time.

$Y_2 = N(t)$ TblStart = 0

$x = t$ ΔTbl = 1

b. Create a table starting at 0 and increase by 5 each time.

Tblstart = 0

ΔTbl = 5

c. What is the advantage of seeing $N(t)$ as t goes from 0,1,2,3,4,5,…? What is the advantage of seeing the table when t increases by 5 each time?

See N(t) for every t

See the limiting value

d. Is there a limiting value?

177.43

Skill #3 Spotting Trends – Limiting Values

Example 4: Construct a table for $f(x) = \frac{(4x^2-1)}{(7x^2+1)}$. Start with 0 and use an increment of 20, use it to determine the limiting value of f.

.57

a. What do you notice as x gets larger?

The values of the function get closer to .57

b. What is the limiting value of the function?

.57

Skill #4 Optimal Values from a Table
We can also use a table to find the maximum or minimum value of a function over a particular interval.

Example 5: Suppose $f(x) = 50 - 9x + \frac{x^4}{30}$ is a function modeling a situation that only makes sense for whole number inputs between 0 and 10. What is the minimum value of f and for what input does this occur?

1. Enter f(x) into Y-window
2. Set TblStart = 0
   ΔTbl = 1
3. Look in the table

Min f(x) = 22.533
when x = 4

Example 6: A model for the number of students in public high schools in the U.S. x years after 1986 is $N(x) = 0.05x^2 - 0.42x + 12.33$ million students. The model is only valid from 1986 to 1996.

a. Construct a table showing all values of this function.

b. Calculate and explain the meaning of $N(8)$.

c. In what year was enrollment the lowest, and what, according to the model, was the enrollment in that that year?

etc.

1986	1987			
0	1			

a) TblStart = 0

ΔTbl = 1

$Y_1 = N(x)$, million students

x, time, years after 1986

(a) $N(8) = 12.173$

Look in the table

In 1994 the enrollment was 12.173 million of students.

(c) 11.453 million of student in 1990.

Example 7: An enterprise rents out paddleboats for all-day use on a lake. The owner knows that he can rent out all 27 of his paddleboats if he charges $1 for each rental. He also knows that he can rent out only 26 if he charges $2 for each rental and that, in general, there will be 1 less paddleboat rental for each extra dollar charges per rental.

a. Construct a formula for the total revenue as a function of the amount charged for each rental.

b. Construct a table for the revenue function in part (a) and determine how much the owner should charge to get the largest revenue. What is this largest revenue?

Revenue = (Charge per boat)(Number of boats)

$\underbrace{\$1 \to 27}_{28}$ boats

$\underbrace{\$2 \to 26}_{28}$ boats

$\underbrace{\$3 \to 25}_{28}$ boats

x = charge per boat

(a) $R(x) = x(28-x) = \boxed{28x - x^2}$

(b) $Y_1 = 28x - x^2$

TblStart = 0

ΔTbl = 1

Charge should be $14 per boat.

Will rent 14 boats.

Revenue = 14(14) $196