Name Last_____First_____ Class time:_____

WORKSHEET: Estimating Limits Numerically Using TABLE on the calculator

EXAMPLE 1: Find the limit using a table of values: $\lim_{x\to 2}(x^2-3x-4)$ where $f(x)=x^2-3x-4$

In the Y= equation editor, enter **Y1=X²–3X–4**

Press **2nd TBLSET** . For **Indpnt** use the cursor (arrow) keys to highlight **Ask** and press **ENTER**

Press **2nd TABLE**:

We need to use values of x approaching 2, while not actually equal to 2.

For X values, enter 1, 1.5, 1.8, 1.9, 1.99, 1.999 into the X column on the calculator table and copy the answers for $f(x)$ from the Y1 column into the table below.

Repeat this process for X values 3, 2.5, 2.2, 2.1, 2.01, 2.001

x	$f(x)$
1	
1.5	
1.8	
1.9	
1.99	
1.999	

x	$f(x)$
3	
2.5	
2.2	
2.1	
2.01	
2.001	

Do the f(x) values in the table appear to be getting closer and closer to a limit?

$\lim_{x\to 2^-}(x^2-3x-4)$ appears to be_____ and $\lim_{x\to 2^+}(x^2-3x-4)$ appears to be_____

and $\lim_{x\to 2}(x^2-3x-4)$ appears to be_____

EXAMPLE 2: Find the limit by using a table of values: $\lim_{x\to 6} f(x)$ where $f(x)=x+\dfrac{1}{(x-6)}$

In the Y= equation editor, enter **Y1=X+1/(X–6)** using parentheses exactly as shown here.

Press **2nd TBLSET** . For **Indpnt** use the cursor (arrow) keys to highlight **Ask** and press **ENTER**

Press **2nd TABLE**:

We need to use values of x approaching 6, while not actually equal to 6.

For X values, enter 5.5, 5.8, 5.9, 5.99, 5.999, 5.9999 into the X column on the calculator table and copy the answers for $f(x)$ from the Y1 column into the table below.

Repeat this process for X values 6.5, 6.2, 6.1, 6.01, 6.001, 6.0001

x	$f(x)$
5.5	
5.8	
5.9	
5.99	
5.999	
5.9999	

x	$f(x)$
6.5	
6.2	
6.1	
6.01	
6.001	
6.0001	

Do the f(x) values in the table appear to be getting closer and closer to a limit?

$\lim_{x\to 6^-}\left(x+\dfrac{1}{(x-6)}\right)$ _____ $\lim_{x\to 6^+}\left(x+\dfrac{1}{(x-6)}\right)$ _____

$\lim_{x\to 6}\left(x+\dfrac{1}{(x-6)}\right)$ _____

EXAMPLE 3: Find the limit by using a table of values: $\lim_{x\to 5} f(x)$ where $f(x)=\dfrac{x^2-25}{x-5}$

Do not simplify. It would no longer be the same function.

State the domain of $f(x)$ _____

Is this function defined at $x = 5$? _____

In the Y= equation editor, enter **Y1=(X²–25)/(X–5)** exactly as shown here using parentheses as shown
Press **2nd TBLSET** . For **Indpnt** highlight **Ask** and press **ENTER.** Press **2nd TABLE**
Enter the value 5 for X into the table. What does the table tell you for $f(5)$? _____

We need to use values of x approaching 5, while not actually equal to 5.
For X values, enter 4.5, 4.8, 4.9, 4.99, 4.999 into the X column on the calculator table
and copy the answers for $f(x)$ from the Y1 column into the table below.
Repeat this process for X values 5.5, 5.2, 5.1, 5.01, 5.001

x	$f(x)$
4.5	
4.8	
4.9	
4.99	
4.999	

x	$f(x)$
5.5	
5.2	
5.1	
5.01	
5.001	

Do the f(x) values in the table appear to be getting closer and closer to a limit?

$\lim_{x\to 5^-} f(x)$ appears to be _____ and $\lim_{x\to 5^+} f(x)$ appears to be_____

$\lim_{x\to 5} f(x)$ appears to be _____ even though $f(5)$ _____

EXAMPLE 4a: Find the limit by using a table of values: $\lim_{x\to 0^+} g(x)$ where $g(x)=(1+x)^{1/x}$

In the Y= equation editor, enter **Y1=(1 + X)^(1/X)** or **Y1=(1 + X)^(1/X)** using parentheses as shown.
Press **2nd TBLSET** . For **Indpnt** highlight **Ask** and press **ENTER.** Press **2nd TABLE**:
We need values of x that are approaching 0, but not equal to 0.
Enter the x values shown below into the X column and then write the calculator values for Y1 as $g(x)$.
Round values of $g(x)$ to 4 decimal places

x	1	0.2	0.1	0.01	0.001	0.0001	0.00001
$g(x)$							

EXAMPLE 4b: Find the limit by using a table of values: $\lim_{x\to\infty} f(x)$ where $f(x)=\left(1+\dfrac{1}{x}\right)^x$ = $(1 + 1/x)^x$

In the Y= equation editor, enter **Y1=(1 + 1/X)^X** or **Y1=(1 + 1/X)^X** , using parentheses as shown.
Press **2nd TBLSET** . For **Indpnt** highlight **Ask** and press **ENTER.** Press **2nd TABLE**:

We need values of x that are increasing and getting very large.
If x continues to increase without bound, we say "x approaches infinity".
Enter the x values shown below into the X column and then write the calculator values for Y1 as $f(x)$.
Round values of $f(x)$ to 4 decimal places

x	1	5	10	100	1000	10000	100000
$f(x)$							

In EXAMPLES 4a & 4b, $\lim_{x\to 0^+}(1+x)^{1/x}$ **and** $\lim_{x\to\infty}\left(1+\dfrac{1}{x}\right)^x$ **both appear to be:**_____ (to 4 decimal places)

****You may have to guess at the limit. It is <u>not</u> an integer or an easy decimal value to estimate. Do your best!*