

Finding Limits Numerically



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- **Enter the function into your calculator**
- **Go to *TBLSET* and set *Indpnt* to *Ask***
- **Go to *TABLE* and manually enter *x*-values that are both slightly below and slightly above the value at which you want to find the limit**

EXAMPLE:

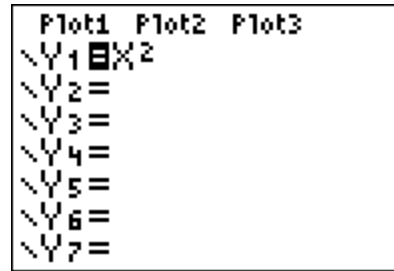
$$y = x^2$$

$$\lim_{x \rightarrow 2} x^2 = ?$$

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```
Plot1 Plot2 Plot3
Y1=X^2
Y2=
Y3=
Y4=
Y5=
Y6=
Y7=
```

```
TABLE SETUP
TblStart=0
ΔTbl=1
Indent: Auto
Depend: Ask
```


EXAMPLE:

$$y = x^2$$

$$\lim_{x \rightarrow 2} x^2 = ?$$

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```
TABLE SETUP
TblStart=0
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Indent: Auto
Depend: Ask
```

X	Y1	
1.9	3.61	
1.99	3.9601	
1.999	3.996	
1.9999	3.9996	

X=

EXAMPLE:

$$y = x^2$$

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Y3=
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Y5=
Y6=
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```

X	Y1	
1.9	3.61	
1.99	3.9601	
1.999	3.996	
1.9999	3.9996	

X=

X	Y1	
2.1	4.41	
2.01	4.0401	
2.001	4.004	
2.0001	4.0004	

X=

EXAMPLE:

$$y = x^2$$

$$\lim_{x \rightarrow 2} x^2 = ?$$

$$\lim_{x \rightarrow 2^-} x^2 = 4$$

$$\lim_{x \rightarrow 2^+} x^2 = 4$$

$$\lim_{x \rightarrow 2} x^2 = 4$$

```
Plot1 Plot2 Plot3
Y1=X^2
Y2=
Y3=
Y4=
Y5=
Y6=
Y7=
```

```
TABLE SETUP
TblStart=0
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Indent: Auto
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X	Y1	
1.9	3.61	
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X=

X	Y1	
2.1	4.41	
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EXAMPLE:

$$y = \frac{1}{x}$$

$$\lim_{x \rightarrow 0} \left(\frac{1}{x} \right) = ?$$

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$$y = \frac{1}{x}$$

$$\lim_{x \rightarrow 0} \left(\frac{1}{x} \right) = ?$$

```
Plot1 Plot2 Plot3
\Y1=1/X
\Y2=
\Y3=
\Y4=
\Y5=
\Y6=
\Y7=
```

```
TABLE SETUP
TblStart=0
ΔTbl=1
Indent: Auto
Depend: Ask
```

X	Y1	
-1	-10	
-.01	-100	
-.001	-1000	
-1E-4	-10000	

X=

X	Y1	
1	10	
.01	100	
.001	1000	
1E-4	10000	

X=

EXAMPLE:

$$y = \frac{1}{x}$$

$$\lim_{x \rightarrow 0} \left(\frac{1}{x} \right) = ?$$

```
Plot1 Plot2 Plot3
\Y1=1/X
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\Y3=
\Y4=
\Y5=
\Y6=
\Y7=
```

```
TABLE SETUP
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```

X	Y1	
-.1	-10	
-.01	-100	
-.001	-1000	
-1E-4	-10000	

X=

X	Y1	
.1	10	
.01	100	
.001	1000	
1E-4	10000	

X=

$$\lim_{x \rightarrow 0^-} 1/x = -\infty$$

$$\lim_{x \rightarrow 0^+} 1/x = \infty$$

$$\lim_{x \rightarrow 0} 1/x = \text{does not exist}$$

We can also explore *piecewise-defined functions*.

$$y = f(x) = \begin{cases} x^2 - 1 & \text{if } x \leq 1 \\ x & \text{if } x > 1 \end{cases}$$

$$\lim_{x \rightarrow 1} f(x) = ?$$

We can also explore *piecewise-defined functions*.

$$y = f(x) = \begin{cases} x^2 - 1 & \text{if } x \leq 1 \\ x & \text{if } x > 1 \end{cases}$$

$$\lim_{x \rightarrow 1} f(x) = ?$$

```

Plot1 Plot2 Plot3
\Y1=(X^2-1)(X<=1)+
(X)(X>1)
\Y2=
\Y3=
\Y4=
\Y5=
\Y6=
    
```

X	Y1	
.9	-.19	
.99	-.0199	
.999	-.002	
.9999	-2E-4	
X=		

X	Y1	
1.1	1.1	
1.01	1.01	
1.001	1.001	
1.0001	1.0001	
X=		

We can also explore *piecewise-defined functions*.

$$y = f(x) = \begin{cases} x^2 - 1 & \text{if } x \leq 1 \\ x & \text{if } x > 1 \end{cases}$$

```
Plot1 Plot2 Plot3
\Y1=(X^2-1)(X<=1)+
(X)(X>1)
\Y2=
\Y3=
\Y4=
\Y5=
\Y6=
```

$$\lim_{x \rightarrow 1} f(x) = ?$$

X	Y1	
.9	-.19	
.99	-.0199	
.999	-.002	
.9999	-2E-4	

X=

X	Y1	
1.1	1.1	
1.01	1.01	
1.001	1.001	
1.0001	1.0001	

X=

$$\lim_{x \rightarrow 1^-} f(x) = 0$$

$$\lim_{x \rightarrow 1^+} f(x) = 1$$

$$\lim_{x \rightarrow 1} f(x) = \text{does not exist}$$

EXAMPLE:

$$y = f(x) = \begin{cases} -x + 1 & \text{if } x \leq 1 \\ x - 1 & \text{if } x > 1 \end{cases}$$

$$\lim_{x \rightarrow 1} f(x) = ?$$

EXAMPLE:

$$y = f(x) = \begin{cases} -x + 1 & \text{if } x \leq 1 \\ x - 1 & \text{if } x > 1 \end{cases}$$

$$\lim_{x \rightarrow 1} f(x) = ?$$

```

Plot1 Plot2 Plot3
Y1 = (-X+1)(X<=1)+(X-1)(X>1)
Y2 =
Y3 =
Y4 =
Y5 =
Y6 =
    
```

X	Y1	
.9	.1	
.99	.01	
.999	.001	
.9999	1E-4	
X=		

X	Y1	
1.01	.01	
1.001	.001	
1.0001	1E-4	
X=1.1		

EXAMPLE:

$$y = f(x) = \begin{cases} -x + 1 & \text{if } x \leq 1 \\ x - 1 & \text{if } x > 1 \end{cases}$$

$$\lim_{x \rightarrow 1} f(x) = ?$$

```

Plot1 Plot2 Plot3
Y1 = (-X+1)(X<=1)+
(X-1)(X>1)
Y2 =
Y3 =
Y4 =
Y5 =
Y6 =
    
```

X	Y1	
.9	.1	
.99	.01	
.999	.001	
.9999	1E-4	
X=		

X	Y1	
1.01	.01	
1.001	.001	
1.0001	1E-4	
X=1.1		

$$\lim_{x \rightarrow 1^-} f(x) = 0$$

$$\lim_{x \rightarrow 1^+} f(x) = 0$$

$$\lim_{x \rightarrow 1} f(x) = 0$$

You Can Count on Numbers!

