

MATH 142 – HANDOUT 1 - EXPERIENCING LIMITS

Suppose we wish to evaluate a complicated limit and so we first do some calculations. Can we tell something about the value of the limit from those calculations?

**Example 1:** For  $\lim_{x \rightarrow 0} f(x)$  we have the following results:

Trial	x	f(x)	V1	V2
1	1.0000000000000000	0.06782644201779	-0.000	0.058
2	0.5000000000000000	0.31204800359232	0.301	0.374
3	0.2500000000000000	0.43005453819076	0.602	0.690
4	0.1250000000000000	0.48637287432959	0.903	1.001
5	0.0625000000000000	0.51366320574679	1.204	1.307
6	0.0312500000000000	0.52706745614678	1.505	1.611
7	0.0156250000000000	0.53370646285771	1.806	1.913
8	0.0078125000000000	0.53700983032972	2.107	2.215
9	0.0039062500000000	0.53865743588199	2.408	2.517
10	0.0019531250000000	0.53948021360588	2.709	2.818
11	0.0009765625000000	0.53989134551773	3.010	3.119
12	0.0004882812500000	0.54009684715038	3.311	3.420
13	0.0002441406250000	0.54019958187519	3.612	3.721
14	0.0001220703125000	0.54025094521330	3.913	4.022
15	0.0000610351562500	0.54027662587578	4.214	4.323

How many digits of the actual answer do you know?

**Example 2:** Another limit:

Trial	x	f(x)	V1	V2
1	1.0000000000000000	-0.70807341827357	-0.000	0.800
2	0.5000000000000000	-0.80684536022267	0.301	1.386
3	0.2500000000000000	-0.83273301295710	0.602	1.984
4	0.1250000000000000	-0.83928136545864	0.903	2.585
5	0.0625000000000000	-0.84092325912411	1.204	3.186
6	0.0312500000000000	-0.84133403332705	1.505	3.788
7	0.0156250000000000	-0.84143674568383	1.806	4.391
8	0.0078125000000000	-0.84146242494851	2.107	4.993
9	0.0039062500000000	-0.84146884483815	2.408	5.595
10	0.0019531250000000	-0.84147044981518	2.709	6.197
11	0.0009765625000000	-0.84147085105968	3.010	6.799
12	0.0004882812500000	-0.84147095137087	3.311	7.401
13	0.0002441406250000	-0.84147097644859	3.612	8.003
14	0.0001220703125000	-0.84147098271842	3.913	8.605
15	0.0000610351562500	-0.84147098428548	4.214	9.207

How many digits of the actual answer do you know?