AP Calculus AB Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Notes: Lessons 2-1 thru 2-3 Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Big Idea #1: Limits**

Consider 



There are certainly many different ways to evaluate a limit.

Consider .

1. By ***graphing*** the function and evaluating it at values of *x* close to 2, the following ***table*** can be formed.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ***x*** | 1.9 | 1.99 | 1.999 | 2.001 | 2.01 | 2.1 |
| ***f(x)*** | 7.22 | 7.9202 | 7.992002 | 8.008002 | 8.0802 | 8.82 |



It should be fairly obvious that 

1. By using ***direct substitution*** the same value of 8 could be obtained.





Consider .

1. The following ***table*** represents what is happening around *x* = 2.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ***x*** | 1.9 | 1.99 | 1.999 | 2.001 | 2.01 | 2.1 |
| ***f(x)*** | 3.9 | 3.99 | 3.999 | 4.001 | 4.01 | 4.1 |

It should be fairly obvious that = 4.

1. If we try ***direct substitution*** right away, we will end up with zero in the denominator. So now we have to find the limit by ***factoring***and then simplifying.



(The graph has a hole when *x* = 2.)

OVER 🡪

Consider .

1. If we try ***direct substitution*** right away, we will end up with .

(Conjugate of the numerator)



1. Using ***rationalization***



(The graph has a hole when *x* = 9.)

\*\*\***Remember: The value of a function at *x = a* is not necessarily equal to **

For example:  but,



Consider the function .

The following ***one-sided limits*** exist:



But . . .

**Big Idea #2: Continuity of a Function**



The following functions each have a discontinuity because one or more of the criteria are not met.

