**Summary 3: Limits**

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| **Definition:** or as means that as *x* gets closer and closer to *a* but without being equal to *a*, *f(x)* gets closer and closer to *L***Note:** technically, finding a limit means searching for a pattern. Practically, though, you *cheat* to find a limit: you do plug in , even though you are not supposed to, and hope for the best:1. **If you get**  that would be the answer
2. **If you get**  the answer is 0
3. **If you get**  the answer is undefined
4. **If you get**  you are out of luck, it tells you *nothing*, you need to do *more work* to find the answer

**Definition:** (Left and Right handed limits) For piecewise defined functions in particular we define:* right-handed limit: means that *x* gets closer and closer to *a*, but *x* is always on the *bigger* side of *a* (*x > a*)
* lefdt-handed limit: means that *x* gets closer and closer to *a*, but *x* is always on the *smaller* side of *a* (*x < a*)

**Theorem:** if and only if and  | **Examples**:        =  is undefined For , find left and right handed limit at :This implies that does not exist |