**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 |