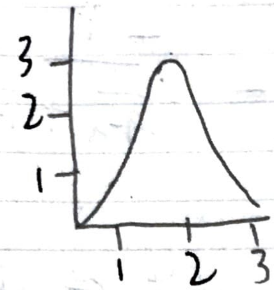
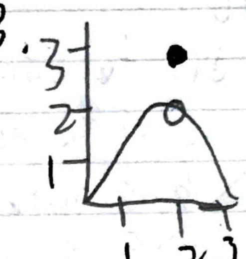
Limits Unit Summary

1. $\lim_{x \to 2} f(x) = 3$ means that as x approaches 2 from both sides, they y value is 3



2. $\lim_{x \to c} f(x)$ DNE when $\lim_{x \to c^-} f(x) != \lim_{x \to c^+} f(x)$,

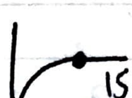
   or when it doesn't converge to 1 single y value, or it approaches infinity.

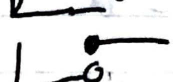
3. 

4. in f(x), if x=1, then the denominator is 0, which is undefined. g(x) cancels it out, so g(1) is defined.

5. In asymptotic notation, as $x \to \infty$, the function becomes it's leading term.

6. $\lim_{x \to c} [f(x) - f(c)] = 0$ simplifies to "as x approaches c, is it equal to the actual f(c)".

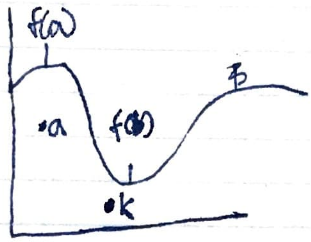
 is defined and continuous

 is not

Okay wait this proof is Hard, though obvious

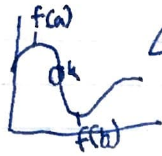
7. f(x) is continuous on a closed interval [a,b] and k is a value between this interval,

IVT doesn't always hold true if k is outside of f(a) to f(b) because f(a) and f(b) are lower and upper bounds for which we know it is continuous.



In this diagram, k is invalid because f(a) and f(b) doesn't cover it, but a is valid because it is covered.

If f(x) is not continuous between f(a), f(b), then k may be on a "gap" section.



in this diagram, k is on the gap, or where it is not continuous

8. $\lim_{x \to c} f(x)$ · uses infinitely small because we want to get as close to c as we can, so we will go to c + .00000001 and c − .000000001.
etc   etc

$\lim_{x \to \pm\infty} f(x)$ uses infinitely large because we are looking at Big O notation, so we can usually exclude lesser degree terms when looking at a function's behavior as it approaches $\pm\infty$