

Math 16A
Kouba
Continuity of Functions

THREE-STEP DEFINITION: Function $y = f(x)$ is *continuous* at $x = a$ if

- i.) $f(a)$ exists (is a finite number)
- ii.) $\lim_{x \rightarrow a} f(x)$ exists (is a finite number)
- iii.) $\lim_{x \rightarrow a} f(x) = f(a)$

SHORTCUT 1: Every polynomial is continuous for all values of x .

SHORTCUT 2: Sums, differences, products, quotients (denominator $\neq 0$), and compositions of continuous functions are continuous.

HERE is a short list of WELL-KNOWN CONTINUOUS FUNCTIONS:

1. $\sin x$ (for all x -values)
2. $\cos x$ (for all x -values)
3. \sqrt{x} (for all $x \geq 0$)
4. $x^{1/3}$ (for all x -values)
5. e^x (for all x -values)– formally introduced in Math 16B
6. $\ln x$ (for all $x > 0$)– formally introduced in Math 16B