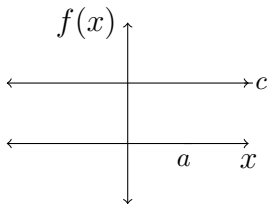
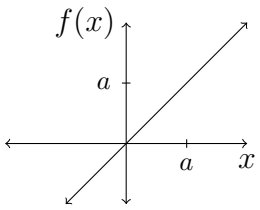
Objectives:

- Define some nice properties of limits (the "Limit Laws")
- Use limit laws to compute more complicated limits

Limits we know: (These are listed in your textbook as limit laws 7 and 8.)



$\lim_{x\to a} c =$ e.g. $\lim_{x\to 3} 7 =$



$\lim_{x\to a} x =$ e.g. $\lim_{x\to 4} x =$

Basic Limit Laws

If $\lim_{x\to a} f(x)$ and $\lim_{x\to a} g(x)$ both exist:

1. $\lim_{x\to a} \big(f(x) + g(x)\big) =$
2. $\lim_{x\to a} \big(f(x) - g(x)\big) =$
3. For any constant c, $\lim_{x\to a} \big(cf(x)\big) =$
4. $\lim_{x\to a} \big(f(x)g(x)\big) =$
5. $\lim_{x\to a} \dfrac{f(x)}{g(x)} =$ ONLY IF

Some Limit Law Examples

1. $\lim_{x\to 2} (x + 4)$
2. $\lim_{h\to 100} (300 - h)$
3. $\lim_{t\to 3} (7t)$
4. $\lim_{x\to 0} \big(x^2\big)$
5. $\lim_{x\to 6} \dfrac{3}{x}$

Building the Rest of the Limit Laws

6. For every positive integer n, $\lim_{x\to a} \big(f(x)\big)^n =$

7. For every positive integer n, $\lim_{x\to a} x^n =$

8. For every positive integer n, $\lim_{x\to a} \sqrt[n]{x} =$

9. For every positive integer n, $\lim_{x\to a} \sqrt[n]{f(x)} =$

Examples Involving Several Limit Laws

(a) Find $\lim_{x\to 1} 5x^{10} - 7x^3 - 8$.

(b) Find $\lim_{x\to 3} \dfrac{2x^3 - 1}{x^2 + 6x}$.

Conclusion: If $f(x)$ is a _____ function,
and $f(a)$ is _____ , then $\lim_{x\to a} f(x) =$ _____ .
We say that these functions have the _____ .

Example $\lim_{t\to 2} \dfrac{t^3 - t + 1}{t + 1}$

Example $\lim_{t\to -1} \dfrac{t^3 - t + 1}{t + 1}$