Properties of Limits

Suppose that the limits $\lim_{x \to a} f(x)$ and $\lim_{x \to a} g(x)$ both exist and let c be a constant. Then

1. $\lim_{x \to a}[f(x) + g(x)] = \lim_{x \to a} f(x) + \lim_{x \to a} g(x)$

2. $\lim_{x \to a}[f(x) - g(x)] = \lim_{x \to a} f(x) - \lim_{x \to a} g(x)$

3. $\lim_{x \to a}[cf(x)] = c \lim_{x \to a} f(x)$

4. $\lim_{x \to a}[f(x)g(x)] = \lim_{x \to a} f(x) \lim_{x \to a} g(x)$

5. $\lim_{x \to a} \dfrac{f(x)}{g(x)} = \dfrac{\lim_{x \to a} f(x)}{\lim_{x \to a} g(x)}$ if $\lim_{x \to a} g(x) \ne 0$

6. $\lim_{x \to a}[f(x)]^n = \left[\lim_{x \to a} f(x)\right]^n$ if n is a positive integer

7. $\lim_{x \to a} \sqrt[n]{f(x)} = \sqrt[n]{\lim_{x \to a} f(x)}$ if the root on the right side exists

Some basic limits:

1. $\lim_{x \to a} x = a$

2. $\lim_{x \to a} c = c$ when c is a constant

3. $\lim_{x \to a} x^n = a^n$

4. $\lim_{x \to a} \sqrt[n]{x} = \sqrt[n]{a}$ if $\sqrt[n]{a}$ exists

Using the properties of limits and basic limits, you can find the limits of more complicated functions.