

# Algebraic Limits

Note Title

8/27/2013

$$\textcircled{1} \lim_{x \rightarrow -2} x^2 - 4x + 1 = (-2)^2 - 4(-2) + 1 = 4 + 8 + 1 = \boxed{13}$$

$$\textcircled{2} \lim_{x \rightarrow -2} \frac{2x-4}{x-2} = \frac{2(-2)-4}{-2-2} = \frac{-4-4}{-4} = \frac{-10}{-4} = \boxed{\frac{5}{2}}$$

$$\textcircled{3} \lim_{x \rightarrow -2} \frac{x^2 - 2x - 8}{x^2 - 4} = \frac{(-2)^2 - 2(-2) - 8}{(-2)^2 - 4} = \frac{4 + 4 - 8}{4 - 4} = \frac{0}{0}$$

$$\begin{aligned} \lim_{x \rightarrow -2} \frac{(x-4)(x+2)}{(x+2)(x-2)} &= \lim_{x \rightarrow -2} \frac{x-4}{x-2} = \frac{-2-4}{-2-2} \\ &= \frac{-6}{-4} = \boxed{\frac{3}{2}} \end{aligned}$$

$$4) \lim_{x \rightarrow 1} \frac{x^2 - 2x + 1}{x^3 - 1} = \frac{(1)^2 - 2(1) + 1}{(1)^3 - 1} = \frac{1 - 2 + 1}{1 - 1} = \frac{0}{0}$$

$$\lim_{x \rightarrow 1} \frac{(x-1)(x-1)}{(x-1)(x^2+x+1)} \quad \lim_{x \rightarrow 1} \frac{x-1}{x^2+x+1} = \frac{1-1}{1+1+1} = \frac{0}{3}$$

$$x^3 - 1$$

$$a=x \quad b=1$$

$$= 0$$

$$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$$

$$* a^3 - b^3 = (a - b)(a^2 + ab + b^2)$$

$$3) \lim_{x \rightarrow 9}$$

$$\frac{\sqrt{x} - 3}{x - 9}$$

$$= \frac{\sqrt{9} - 3}{9 - 9}$$

$$= \frac{0}{0}$$

$$\lim_{x \rightarrow 9}$$

$$\frac{\sqrt{x} - 3}{x - 9} \left[ \frac{\sqrt{x} + 3}{\sqrt{x} + 3} \right]$$

$$= \frac{x - 9}{(x - 9)(\sqrt{x} - 3\sqrt{x} - 9)}$$

\* only multiply conjugates

$$\lim_{x \rightarrow 9}$$

$$\frac{x - 9}{(x - 9)(\sqrt{x} + 3)}$$

$$= \lim_{x \rightarrow 9}$$

$$\frac{1}{\sqrt{x} + 3}$$

$$= \frac{1}{\sqrt{9} + 3}$$

$$= \frac{1}{3 + 3} = \boxed{\frac{1}{6}}$$