

$$\lim_{h \rightarrow 0} \frac{(x+h)^3 - x^3}{h}$$

$$\lim_{h \rightarrow 0} \frac{x^3 + 3x^2h + 3xh^2 + h^3 - x^3}{h}$$

$$\lim_{h \rightarrow 0} \frac{h(3x^2 + 3xh + h^2)}{h} = \boxed{3x^2}$$

$$\lim_{x \rightarrow 2} \frac{x^2 - 2x}{x^2 - 4x + 4} = \frac{0}{0}$$

$$\lim_{x \rightarrow 2} \frac{x(x-2)}{(x-2)^2} =$$

$$\lim_{x \rightarrow 2} \frac{x}{x-2} = \frac{2}{2-2} = \frac{2}{0} = +\infty$$

$$= \frac{1}{\sqrt{3}-1+\sqrt{2}} = \frac{1}{\sqrt{2}+\sqrt{2}}$$

$$= \frac{1}{2\sqrt{2}} = \frac{\sqrt{2}}{4}$$

$$\lim_{x \rightarrow 3} \frac{\sqrt{x-1} - \sqrt{2}}{x-3} = \frac{0}{0}$$

$$\lim_{x \rightarrow 3} \frac{\sqrt{x-1} - \sqrt{2}}{x-3}$$

$$\lim_{x \rightarrow 3} \frac{(\sqrt{x-1} - \sqrt{2})(\sqrt{x-1} + \sqrt{2})}{(x-3)(-\sqrt{x-1} + \sqrt{2})}$$

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

$$\lim_{x \rightarrow 3} \frac{x-1-2}{(x-3)(\sqrt{x-1} + \sqrt{2})}$$

$$\lim_{x \rightarrow 3} \frac{x-3}{(x-3)(\sqrt{x-1} + \sqrt{2})}$$

$$\lim_{x \rightarrow 3} \frac{1}{\sqrt{x-1} + \sqrt{2}}$$

b)

$$\lim_{x \rightarrow -5} \frac{x+5}{x^2-25} = \frac{0}{0}$$

$$\lim_{x \rightarrow -5} \frac{x+5}{x^2-5^2}$$

$$\lim_{x \rightarrow -5} \frac{\cancel{x+5}}{(x-5)\cancel{(x+5)}}$$

$$= \frac{-1}{10}$$

a) $\lim_{x \rightarrow 1} \frac{x^3 - 1}{x^2 - 1}$

$\lim_{x \rightarrow 1} \frac{x^3 - 1}{x^2 - 1} = \frac{1^3 - 1}{1^2 - 1} = \frac{1 - 1}{1 - 1} = \frac{0}{0}$

$\lim_{x \rightarrow 1} \frac{x^3 - 1}{x^2 - 1}$

$\lim_{x \rightarrow 1} \frac{(x-1)(x^2 + x(1) + 1^2)}{x-1}$

$\lim_{x \rightarrow 1} \frac{\cancel{(x-1)}(x^2 + x + 1)}{\cancel{x-1}}$

$\lim_{x \rightarrow 1} x^2 + x + 1$

$1 + 1 + 1$

$1 + 1 + 1$

$= 3$

$\lim_{x \rightarrow 1} \frac{x^3 - 1}{x^2 - 1} = 3$