

Math 2215 - Calculus 1

Quiz #4 - 2016.09.01

Solutions

Compute the following limit:

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

$$\begin{aligned} \lim_{x \rightarrow a} \frac{\frac{1}{x^2} - \frac{1}{a^2}}{x - a} &= \lim_{x \rightarrow a} \frac{\frac{a^2 - x^2}{a^2 x^2}}{x - a} \\ &= \lim_{x \rightarrow a} \frac{\frac{(a-x)(a+x)}{a^2 x^2}}{x - a} \\ &= \lim_{x \rightarrow a} \frac{(a-x)(a+x)}{a^2 x^2 (x-a)} \\ &= \lim_{x \rightarrow a} -\frac{(x-a)(a+x)}{a^2 x^2 (x-a)} \\ &= \lim_{x \rightarrow a} -\frac{(a+x)}{a^2 x^2} \\ &= -\frac{2a}{a^4} \\ &= -\frac{2}{a^3} \end{aligned}$$