

Math 2215 - Calculus 1

Quiz #22 - 2017.12.06

Solutions

1. Compute the following limit: $\lim_{x \rightarrow 3} \frac{\sqrt{x^2 + 7} - 4}{x - 3}$

$$\begin{aligned}\lim_{x \rightarrow 3} \frac{\sqrt{x^2 + 7} - 4}{x - 3} &= \lim_{x \rightarrow 3} \frac{\sqrt{x^2 + 7} - 4}{x - 3} \cdot \frac{\sqrt{x^2 + 7} + 4}{\sqrt{x^2 + 7} + 4} \\ &= \lim_{x \rightarrow 3} \frac{x^2 + 7 - 16}{x - 3} \cdot \frac{1}{\sqrt{x^2 + 7} + 4} \\ &= \lim_{x \rightarrow 3} \frac{x^2 - 9}{x - 3} \cdot \frac{1}{\sqrt{x^2 + 7} + 4} \\ &= \lim_{x \rightarrow 3} \frac{(x + 3)(x - 3)}{x - 3} \cdot \frac{1}{\sqrt{x^2 + 7} + 4} \\ &= \lim_{x \rightarrow 3} \frac{x - 3}{x - 3} \cdot \frac{x + 3}{\sqrt{x^2 + 7} + 4} \\ &= \lim_{x \rightarrow 3} \frac{x - 3}{x - 3} \cdot \lim_{x \rightarrow 3} \frac{x + 3}{\sqrt{x^2 + 7} + 4} \\ &= 1 \cdot \frac{6}{8} \\ &= \frac{3}{4}\end{aligned}$$