

# Math 2215 - Calculus 1

Quiz #3 - 2016.08.25

Solutions

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Compute the following limit:

$$\lim_{x \rightarrow 0} \frac{2x}{3 - \sqrt{x+9}}$$

First we note that this is in the form  $0/0$ , so there is hope the limit exists. So we multiply both the numerator and denominator by  $3 + \sqrt{x+9}$ , and then simplify:

$$\begin{aligned} \lim_{x \rightarrow 0} \frac{2x}{3 - \sqrt{x+9}} &= \lim_{x \rightarrow 0} \frac{2x}{3 - \sqrt{x+9}} \cdot \frac{3 + \sqrt{x+9}}{3 + \sqrt{x+9}} \\ &= \lim_{x \rightarrow 0} \frac{2x(3 + \sqrt{x+9})}{9 - (x+9)} \\ &= \lim_{x \rightarrow 0} \frac{2x(3 + \sqrt{x+9})}{-x} \\ &= \lim_{x \rightarrow 0} -\frac{x}{x} \cdot \frac{2(3 + \sqrt{x+9})}{1} \\ &= \lim_{x \rightarrow 0} -2(3 + \sqrt{x+9}) \\ &= \lim_{x \rightarrow 0} -12 \end{aligned}$$