

# Math 2143 - Brief Calculus with Applications

Quiz #9 - 2008.03.06

Solutions

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1. Compute the following limit.

$$\begin{aligned}\lim_{x \rightarrow 2} \frac{x^4 - 16}{x - 2} &= \lim_{x \rightarrow 2} \frac{(x - 2)(x + 2)(x^2 + 4)}{x - 2} \\ &= \lim_{x \rightarrow 2} (x + 2)(x^2 + 4) \\ &= 4 \cdot 8 = 32\end{aligned}$$

2. Compute the following derivative.

$$\begin{aligned}\frac{d}{dt} \left( \left( 3t - \frac{3t-1}{2t+1} + 1 \right) (3t^3 - 3t^2 + \sqrt{t} - 1) \right) \\ &= \left( \frac{d}{dt} \left( 3t - \frac{3t-1}{2t+1} + 1 \right) \right) (3t^3 - 3t^2 + \sqrt{t} - 1) + \left( 3t - \frac{3t-1}{2t+1} + 1 \right) \left( \frac{d}{dt} (3t^3 - 3t^2 + \sqrt{t} - 1) \right) \\ &= \left( 3 - \frac{3(2t-1) - (3t-1)2}{(2t+1)^2} \right) (3t^3 - 3t^2 + \sqrt{t} - 1) + \left( 3t - \frac{3t-1}{2t+1} + 1 \right) \left( 9t^2 - 6t + \frac{1}{2\sqrt{t}} \right)\end{aligned}$$