Math 2143 - Brief Calculus with Applications

Quiz #12 - 2008.03.24

Solutions

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1. Compute the following limit.

$$\begin{aligned}
\lim_{x\to 0}\frac{x}{\sqrt{1+3x}-1} &= \lim_{x\to 0}\frac{x}{\sqrt{1+3x}-1}\cdot\frac{\sqrt{1+3x}+1}{\sqrt{1+3x}+1}\\
&= \lim_{x\to 0}\frac{x\left(\sqrt{1+3x}+1\right)}{1+3x-1}\\
&= \lim_{x\to 0}\frac{x\left(\sqrt{1+3x}+1\right)}{3x}\\
&= \lim_{x\to 0}\frac{\sqrt{1+3x}+1}{3}\\
&= \frac{2}{3}
\end{aligned}$$

2. Compute the following derivative.

$$\frac{d}{dz}\left(4z^2+\frac{3z^2+1}{4z^3-\frac{1}{z}}\right)^3 = 3\left(4z^2+\frac{3z^2+1}{4z^3-\frac{1}{z}}\right)^2\cdot\left(8z+\frac{(6z)\left(4z^3-\frac{1}{z}\right)-\left(3z^2+1\right)\left(12z^2+\frac{1}{z^2}\right)}{\left(4z^3-\frac{1}{z}\right)^2}\right)$$