Math 2143 - Brief Calculus with Applications

Quiz #6 - 2008.02.26

Solutions

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1. Compute the following limit:

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

2. Compute the slope of the tangent line to $g(x)=x^2-2x+1$ at $x=4$.

We will simply compute $g'(4)$.

$$\frac{dg}{dx}=2x-2 \longrightarrow g'(4)=6,$$

so the slope of the tangent line to $g(x)$ at $x=4$ is $m=6$.