Name: _____ Points: _____

1. The position of a metal bolt falling from a skyscraper has the position function $s(t) = -16t^2 + 19$ in feet and time measured in seconds. Find the instantaneous velocity of the metal bolt when the time is two seconds by evaluating the limit: $\lim_{t \to 2} \frac{s(2) - s(t)}{2 - t}$.

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2. Which derivative is approximated by $\dfrac{-\cos\left(\dfrac{\pi}{4}-0.00000012\right)+\dfrac{\sqrt{2}}{2}}{0.00000012}$?

3. State and use the **limit definition of derivatives** to compute $f'(a)$ and find the equation of the tangent line to $f(x)=-x+2x^2$ at $a=-1$.

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4. Find the first derivatives of the functions below using the power rule and appropriate properties of derivatives.

a) $f(x)=3\sqrt{x}-x^{e}+e^{x}+e^{2}$

b) $f(x)=x^{-4}\left(5x^{2}-1\right)^{2}$

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