

Name : Id #..... List no:

1. A particle moves along the curve $y = \sqrt{1 + x^3}$. As it reaches the point $(2, 3)$, the y -coordinate is increasing at the rate of 4 cm/s . How fast is the x -coordinate changing at that instant?
2. Find the linearization of $f(x) = e^{x^2}$ at $a = 1$ and use it to approximate $f(0.99)$.
3. Normal Line: $2xy + \pi \sin y = 2\pi, \left(1, \frac{\pi}{2}\right)$.
4. If 1200 cm^2 of material is available to make a box with a square base and an open top, find the largest possible volume of the box.

5. **The Mean Value Theorem:** $f(x) = \ln x$, $[e, 2e]$.

6. Find the absolute maximum and the absolute minimum values: $f(x) = x - \ln x$, $[e^{-1}, e^2]$.

7. $\lim_{x \rightarrow 0^+} (1 + \sin 2x)^{\cot x}$.

8. $\frac{d^{10}}{dx^{10}}(x \ln x) =$