

If m_2 be the slope of the function $(y = \log_3 x)$ at $(x=1)$. Then _____
 $(m_1 = \frac{m_2}{\ln(3)})$

[MTH381] Consider the function $(y = f(x) = 3e^{-2x} - 5e^{-4x})$ and describe.
The function has a local maximum at $(x = \frac{1}{2} \ln(\frac{10}{3}))$

[MTH381] Let $(u(x, y, z))$ be a vector field such that $(u(0, 0, 0)) = [1, 0, 1]$ and $(\text{div } u|_{(0, 0, 0)}) = 3$. Then $(\text{div } (x^2 + 2x + y^2 - z^2 + 5)u|_{(0, 0, 0)})$ is equal to what?
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[MTH381] Consider the curve whose equation is $(x^4 + y^4 + 3xy = 5)$. The slope of the tangent line, $(\frac{dy}{dx})$, at the point $(1, 1)$ is
 (-1)

[MTH381] A particle moves in a circle according to the equation $(\bar{r} = \cos(t^2)\hat{i} + \sin(t^2)\hat{j})$. The magnitude of the normal component of the acceleration at time (t) is
 $(4t^2)$

[MTH381] The maximum value of $(xy)^6$ on the ellipse $(\frac{x^2}{4} + y^2 = 1)$ occurs at point $((x, y))$ for which (y^2) is equal to what?
 $(\frac{1}{2})$

[MTH381] Evaluate the limit $(\lim_{(x, y) \rightarrow (0, 0)} \frac{xy}{x^2 + y^2})$
the limit does not exist

[MTH381] The tangent plane to the graph of the function $(z = x^2y + \frac{1}{2}(1 + y^2))$ at the point $((1, 1, \frac{3}{2}))$ contains point $((2, 2, t))$ for which value of (t) ?
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[MTH381] Two kinds of bacteria are found in a sample of tainted food. It is found that the populations size of type 1, (N_1) and of type 2, (N_2) satisfy the equations $(\frac{dN_1}{dt} = -k_1 N_1, N_1(0) = N_{1,0})$ and $(\frac{dN_2}{dt} = -k_2 N_2, N_2(0) = N_{2,0})$. Then the population sizes equal $(N_1 = N_2)$ at the following time.
 $(t = \ln(100))$

[MTH381] Consider the vector field $(v(x, y) = 2x\hat{i} + y\hat{j})$ in the xy plane. Let C be a smooth simple closed curve in the xy -plane travelled counterclockwise and enclosing the region of area 10. Let (n) denote the outer unit normal vector to C . Then evaluate this integral $(\oint_C v \cdot n \, ds)$.
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