

#0 Mu Ciphering

MA \odot National Convention 2015

Find the equation of the tangent line to the graph $y = \sin x + x$ at the point $(0, 0)$, written in slope-intercept form.

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#1 Mu Ciphering**MAΘ National Convention 2015**

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Find k such that the line $y = x + 4$ is tangent to the graph of the function $f(x) = k\sqrt{x}$.

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#4 Mu Ciphering**MA© National Convention 2015**

A printed page has 2.5 cm margins at the top and bottom and 2 cm margins at the sides. If the area of the printed portion is to be 250 square cm, what should the dimensions of the page be to use the least paper?

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#5 Mu Ciphering**MA \odot National Convention 2015**

A region is bounded in quadrant I by the **x**-axis, $y = -4x+12$ and $y = x^2$. What is the resulting volume if the region is rotated about the **y**-axis?

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#6 Mu Ciphering**MA \odot National Convention 2015**

If the angle of elevation of the sun is 45 degrees

and is decreasing at $\frac{1}{8}$ rad/hour, how fast, in

meters per hour, is the shadow cast on the ground
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#7 Mu Ciphering**MA \odot National Convention 2015**

Find the volume of the solid having as its base the region bounded by the ellipse with equation

$$\frac{x^2}{9} + \frac{y^2}{16} = 1 \text{ and semicircular cross-sections}$$

perpendicular to the y-axis.

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Evaluate: $\lim_{n \rightarrow \infty} \sum_{i=1}^n \left(\frac{18}{n} - \frac{3i}{n^2} \right)$

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Determine the area of the region bounded by the line

$$y = \frac{1}{2}x \text{ and the parabola } y^2 = 8 - x.$$

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#12 Mu Cipheryng
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If $y = x^{x^x}$, the value of $\left. \frac{dy}{dx} \right|_{x=2}$ can be written as

$A + B \ln 2 + C (\ln 2)^2$, where A , B , and C are positive integers. Find the value of $A + B + C$.

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