Find the equation of the tangent line to the graph \( y = \sin x + x \) at the point \((0, 0)\).
A line with negative slope passes through $(2,0)$ and is tangent to \( \frac{x^2}{2} + \frac{y^2}{1} = 1 \). The line can be written in the form \( y = mx + b \). Compute \( \frac{b}{m} \).
Evaluate the improper integral:

$$\int_{-7}^{2} \frac{dx}{(x - 1)^{\frac{2}{3}}}$$
Find the maximum value, on the interval $\left[0, \frac{\pi}{6}\right]$, of $y = 24 \sin(3x) + 8 \cos(6x)$.
Right triangle ZLU is inscribed in a circle, with radius 24 and hypotenuse $ZL$. $\angle Z$ is increasing at a rate of $10^\circ$ per minute as U moves along the circumference of the circle (while Z and L remain fixed). The area of the triangle is changing at $k\pi$ square units per minute when $\angle Z = 30^\circ$. What is $k$?
The area bounded by $y = \arctan x$, $x = 0$, and $y = \frac{\pi}{4}$ is $L$. Compute $e^{8L}$. 

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A particle moves along the x-axis so that $v(t) = t^2 - 3t$ for $0 \leq t \leq 4$. If its position at time 0 is 4, what is the greatest distance between the particle and the origin?
If a banquet hall sells tickets at a price of $L$ each, then $200 - 4L$ tickets will be sold. Each event costs the banquet hall $200, plus an additional $10 per person. How much should they charge, in dollars per ticket, to maximize their profit?
What is the total area between the curves $y = -6x$ and $y = 6x^2 - 18x$ for $1 \leq x \leq 3$?
The region bounded by the $x$-axis, $y = x - 2$, and $y = \sqrt{x}$ is revolved about the $x$-axis. The volume is $\frac{L\pi}{U}$, where $L$ and $U$ are relatively prime positive integers. What is $L + U$?
If \( x = t^2 \) and \( y = \ln(t^2 + 1) \), then at \( t = 1 \), \( \frac{d^2 y}{dx^2} = ? \).
The region bounded by $y = -x^2 + x$ and the $x$-axis is $L$. Region $L$ is the base of a solid, and cross sections of this solid perpendicular to the $x$-axis are isosceles right triangles with hypotenuses on $L$. What is the volume of this solid?
Let $f$ and $h$ be functions satisfying:

\[
(h(x))^3 = f^{-1}(6057x - 6057)
\]

Compute:

\[
(h(x))^2 h'(x) f' \left( (h(x))^3 \right)
\]