

- Find the limit: $\lim_{x \rightarrow 8} \frac{\sqrt{2+\sqrt{x}} - 2}{x-8}$
- Suppose that a boomerang is thrown at $t = 0$ and its position is given by :
 $x = \sin t + \sqrt{3} \cos t$
 $y = \cos t - \sqrt{3} \sin t$
 where t is in seconds ($t \geq 0$), and x and y are measured in hundreds of feet. Find the smallest value of t for which $\frac{dx}{dt} + \sqrt{3} \frac{dy}{dt} = 0$.
- Find the x -intercept of the line normal to the graph of $y = (x - \sqrt{x})^3$ at $x = 4$.
- The Chebyshev polynomials can be defined as follows:
 $T_0(x) = 1$ $T_1(x) = x$ and $T_n(x) = 2x T_{n-1}(x) - T_{n-2}(x)$ for $n \geq 2$.
 What is the value of $\int_{-1}^1 T_3(x) dx$?
- Find the coordinates of the inflection point of $y = \frac{9-9x}{x^2}$.
- The rate of decay of a radioactive substance is directly proportional to the amount present. Three days ago a radioactive sample contained 5 grams, and today 4 grams are left. How much of the sample will be left six days from now ?
- Find a if $\sinh a = \frac{1}{2} \int_{-\sqrt{3}}^{\sqrt{3}} e^x dx$.
- After a major drug bust at Miami International Airport, the seized cocaine is taken to a heavily guarded warehouse to be held as evidence. Here it is being poured forming a conical pile at a rate of 4 cubic feet per minute in such a way that the height always equals the diameter of the base. How fast is the height growing when the pile has a volume of 144π cubic feet?
- Find q if $f(x) = \sqrt{6x+4}$ and $f'(0) + q f''(0) = 0$.
- After the graph of $y = \ln x$ is reflected across the line asymptotic to the inverse of the function $y = 2^{-x} \sin x$, and shifted 4 units to the right, its new equation is $y = \underline{\hspace{2cm}}$.
- Let $f(x) = xe^{-x}$.
 $A = \lim_{x \rightarrow \infty} f(x)$ $B =$ slope of tangent line to $y = f(x)$ at $x = -1$
 $C = \int_0^1 f(x) dx$ $D =$ maximum value of $f(x)$ Find $A + B + C/D$.
- Find the area of the region that lies to the right of the y -axis, below $y = x^3$ and to the left of $|y| = 2 - x$.
- What is the minimum value of $f(x)$ if $f(x) = x^3 - 9x^2 - 8x + 30$?
- What is the total area of the region inside the polar graph of $r = 6 \sin \theta$?
- Find k if $\int_{-1/2}^{1/2} \frac{k}{\sqrt{1-x^2}} dx = \pi$.