

1.	$\lim_{x \rightarrow 0} \frac{\sqrt{x+2} - \sqrt{2}}{x} =$
2.	$\lim_{\Delta x \rightarrow 0} \frac{(x + \Delta x)^3 - x^3}{\Delta x} =$
3.	$\lim_{x \rightarrow 2} \frac{x-2}{x^2 - x - 2} =$
4.	Find the equation(s) of the tangent line(s) to the graph of $f(x) = 4x - x^2$ that passes through the point (2, 5) in slope intercept form.
5.	$f(x) = \sqrt{x+1}$ Find $f'(x)$
6.	Find an equation of the tangent line to the graph of $f(x) = x^2 + 2x + 1$ that passes through the point (-3, 4).
7.	$f(x) = \frac{x}{x^2 + 1}$ Find $f'(x)$
8.	$f(t) = \frac{\cos t}{t^3}$ Find $f'(t)$
9.	$y = 2x \sin x + x^2 \cos x$ Find $y'$
10.	$y = \sin(\pi x)^2$ Find $y'$
11.	$f(\theta) = \frac{1}{4} \sin^2(2\theta)$ Find $f'(\theta)$
12.	$x^{1/2} + y^{1/2} = 9$ Find $\frac{dy}{dx}$
13.	$x^3 - 3x^2y + 2xy^2 = 12$ Find $\frac{dy}{dx}$
14.	Write the Maclaurin series for $\cos x$ , showing at least 5 terms.
15.	Write the Maclaurin series for $e^x$ , showing at least 5 terms.

16. The radius  $r$  of a circle is increasing at a rate of 3 centimeters per minute. Find the rate of change of the area when the radius is 6 cm.

17. A conical tank (with vertex down) is 10 feet across the top and 12 feet deep. If water is flowing into the tank at a rate of 10 cubic feet per minute, find the rate of change of the depth of the water when the water is 8 feet deep.

18. A ladder 25 feet long is leaning against the wall of a house. The base of the ladder is pulled away from the wall at a rate of 2 feet per second. How fast is the top moving down the wall when the base of the ladder is 7 feet from the wall?

19. Locate the absolute extrema of the function  $g(t) = \frac{t^2}{t^2 + 3}$  on the closed interval  $[-1, 1]$

20. Find all relative extrema of  $f(x) = x^3 - 3x^2 + 3$

21. Let  $R$  be the region in the first quadrant enclosed by the graph of  $y = \sqrt{6x + 4}$ , the line  $y = 2x$ , and the  $y$ -axis. Find the area of  $R$

22. Let  $R$  be the region in the first quadrant enclosed by the graph of  $y = \sqrt{6x + 4}$ , the line  $y = 2x$ , and the  $y$ -axis. Find the volume of the solid generated when  $R$  is revolved about the  $x$ -axis.

23. Find the arc length along the curve  $y = \frac{x^4}{8} + \frac{1}{4x^2}$  over the interval  $[1, 2]$ .