

Differentiating 2.1 – 2.7

Find the derivative of each function.

1.) $f(\theta) = \frac{\pi}{2} \sin \theta - \cos \theta$	2.) $y = 3\sqrt{x} - \frac{1}{2} \cos x$
3.) $f(x) = \frac{1}{2} e^x - 3 \sin x$	4.) $f(x) = \frac{1}{x^2} - 2e^x$

Find the slope of the graph of the function at the given point. Use proper notation.

5.) $f(\theta) = 4 \sin \theta - \theta, (0, 0)$	6.) $f(x) = \frac{3}{4} e^x, (0, \frac{3}{4})$
--------------------------------------------------	------------------------------------------------

Write the equation of the tangent line to the graph of the function at the given point

7.) $f(x) = x + e^x, (0, 1)$	8.) $g(t) = \sin t + \frac{1}{2} e^t, (\pi, \frac{1}{2} e^\pi)$
------------------------------	-----------------------------------------------------------------

Determine the point(s) (if any) at which the graph of the function has a horizontal tangent line.

9.) $f(x) = -4x + e^x$	10.) $g(x) = x + \sin x, 0 \leq x < 2\pi$
------------------------	-------------------------------------------

For problems 11-14, use proper notation throughout.

11.) Consider the function $f(t) = \ln t$.

a.) Calculate the instantaneous rate of change of the function at $t = \frac{1}{2}$.	b.) Find the equation of the tangent line at the point where $t = 3$. Leave your answer in terms of the natural logarithm.
---------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------

12.) Find the following using the Limit Definition of Derivative. You should be able to do this with very little computation.

a.) $\lim_{\Delta x \rightarrow 0} \frac{\sin(x+\Delta x) - \sin(x)}{\Delta x}$	b.) $\lim_{h \rightarrow 0} \frac{(x+h)^2 - x^2}{h}$
c.) $\lim_{x \rightarrow \frac{\pi}{4}} \frac{\sin x - \sin \frac{\pi}{4}}{x - \frac{\pi}{4}}$	d.) $\lim_{h \rightarrow 0} \frac{\sin(\frac{\pi}{6}+h) - \frac{1}{2}}{h}$
e.) $\lim_{\Delta x \rightarrow 0} \frac{(2+\Delta x)^3 - 8}{\Delta x}$	f.) $\lim_{x \rightarrow \pi} \frac{\cos x + 1}{x - \pi}$
g.) $\lim_{x \rightarrow 2} \frac{\ln x - \ln 2}{x - 2}$	h.) $\lim_{\Delta x \rightarrow 0} \frac{(3+\Delta x)^2 + (3+\Delta x) - 12}{\Delta x}$