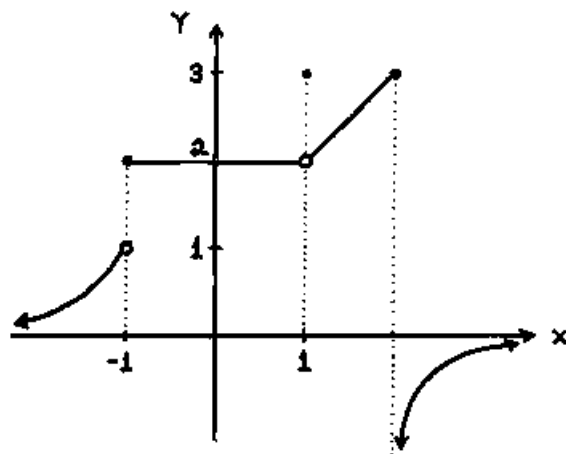
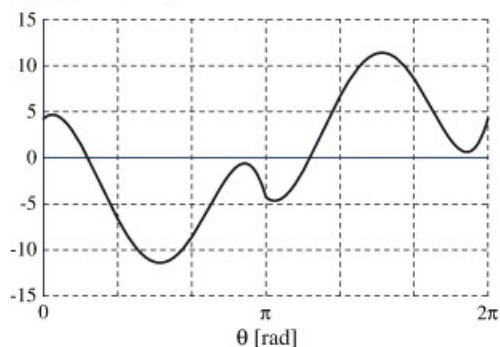


1. For the function f whose graph is given¹, state the value of each quantity, if it exists. If it does not exist, explain why.



- (a) $\lim_{x \rightarrow -1} f(x)$
 (b) $\lim_{x \rightarrow 0} f(x)$
 (c) $\lim_{x \rightarrow 1} f(x)$
 (d) $\lim_{x \rightarrow 2} f(x)$
2. Using the definition of the derivative, find the slope of the curve $y = x^3$ at the point $x = 1$. (Hint: $x^3 - 1$ factors.)
3. Sketch the derivative of the function pictured below².



¹Image borrowed from <https://www.math.ucdavis.edu/~kouba/CalcOneDIRECTORY/limconsoldirectory/LimConSol.html>

²Image borrowed from *Mechanism and Machine Theory, Volume 62, April 2013, Pages 51–62.*

4. Differentiate the function using the appropriate rules for derivatives.

(a) $y = (x - 2)(3x + 7)$

(b) $y = \sqrt{x} - 3e^x$

(c) $u = \frac{\sqrt{t-t^2}}{\sqrt[3]{t}}$

(d) $f(x) = \pi^\pi - e$

5. Find an equation of the tangent line to the curve $y = \sqrt[4]{x} + 2$ at the point $(1, 1)$.

6. At what point(s) on the curve $y = x\sqrt{x}$ is the tangent line parallel to the line $y = 1 + 3x$?