

Various derivative problems (§§2.3–2.5, 3.3)

1. Chapter 2 review exercises: #11, #19, #25
2. Find the derivative of $\frac{e^x}{\tan^{-1} x}$.
3. Find the derivative of $x \ln x - x$.
4. Each of the following limits is the derivative of a function at some point. Use what you know about evaluating derivatives symbolically to determine the limit. For example, $\lim_{h \rightarrow 0} \frac{\cos(\pi/4 + h) - \cos(\pi/4)}{h}$ is, by definition, the derivative of $\cos x$ at $x = \pi/4$. We know the derivative of $\cos x$ is $-\sin x$, and $-\sin \pi/4 = -1/\sqrt{2}$. So, $\lim_{h \rightarrow 0} \frac{\cos(\pi/4 + h) - \cos(\pi/4)}{h} = -1/\sqrt{2}$.

(a) $\lim_{h \rightarrow 0} \frac{\sqrt{4+h} - 2}{h}$

(b) $\lim_{h \rightarrow 0} \frac{\tan(\pi/4 + h) - 1}{h}$