

TeX code compiled with `\documentclass{beamer}` using the Amsterdam theme.

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\begin{document} \begin{frame} Is the function  $f(x)=\begin{cases} 2-x & \text{if } x \leq 2 \\ x^2-4x+4 & \text{if } x > 2 \end{cases}$  differentiable at 2? \end{frame} \begin{frame} Find all  $a$  and  $b$  such that the function  $g(x)=\begin{cases} 2-x & \text{if } x \leq 2 \\ x^2+ax+b & \text{if } x > 2 \end{cases}$  is differentiable for all  $x$ . \end{frame} \begin{frame} You are designing the first ascent and drop for a roller coaster. You want the slope of the ascent to be  $.8$  and the slope of the drop to be  $-1.6$ . You will connect these two straight stretches by part of a parabola  $y=ax^2+bx+c$  of width  $100$  units. \begin{enumerate}[a] \item Certainly you don't want a sharp corner in your tracks at the points where the linear parts meet the parabola. This puts a condition on the tangent lines of the parabola -- what's the condition? \item Find a formula for the parabola. \end{enumerate} \end{frame} \begin{frame} If  $f + g$  is differentiable at  $a$ , are  $f$  and  $g$  necessarily differentiable at  $a$ ? \end{frame} \begin{frame} If  $f'(a)$  exists,  $\lim_{x \rightarrow a} f(x)$  \begin{itemize} \item[i] must exist, but there is not enough information to determine it exactly. \item[ii] equals  $f(a)$ . \item[iii] equals  $f'(a)$ . \item[iv] may not exist. \end{itemize} \end{frame} \begin{frame} A slow freight train chugs along a straight track. The distance it has traveled after  $x$  hours is given by a function  $f(x)$ . An engineer is walking along the top of the box cars at the rate of  $3$  miles per hour in the same direction as the train is moving. The speed of the man relative to the ground is \begin{itemize} \item[i]  $f(x) + 3$  \item[ii]  $f'(x) + 3$  \item[iii]  $f(x) - 3$  \item[iv]  $f'(x) - 3$  \end{itemize} \end{frame} \end{document}

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