TeX code compiled with \documentclass{beamer} using the Amsterdam theme.
There are two png images needed to compile slides:

product_linesegments.png

circ.png

\begin{document} \begin{frame} \large The functions $f(x)$ and $h(x)$ are graphed below: \begin{center} \includegraphics[height=4cm]{product_linesegments.png} \end{center} \begin{enumerate} \item Graph the function $g(x) = (2f - h)(x)$. \item Label the slopes along the line segments of $f$, $g$, and $h$. \item Plot $f'$, $g'$, and $h'$. Do these graphs agree with the differentiation rules? How are these derivatives related? \end{enumerate} \end{frame} \begin{frame} Assume the functions $f$ and $g$ are such that: $$ f(5) = 1 \hskip 30pt f '(5) = 9$$ $$ g(5) = -4 \hskip 30pt g'(5) = 5$$ Evaluate the following expressions: \begin{itemize} \item[\bf (a)] $(f+g)'(5)$ \item[\bf (b)] $(fg)'(5)$ \item[\bf (c)] $(f/g)'(5)$ \item[\bf (d)] $(g/f)'(5)$ \item[\bf (e)] $\dfrac{d}{dx}\left(\dfrac{g(x)}{x}\right)$ at $x=5$. \end{itemize} \end{frame} \begin{frame} \LARGE \begin{columns} \begin{column}{0.5\textwidth} Easier problems: $$f(x)=x^4-2x^2+6$$ \vskip 15pt $$g(x)=7x + 4x^{-1/8}$$ \vskip 15pt $$h(x)=\dfrac{x^4}{5-x^3}$$ \end{column} \begin{column}{0.5\textwidth} Harder problems: $$F(x)=\sqrt{x}(x-4)$$ \vskip 15pt $$G(x)=\dfrac{8x^2 + 2x + 4}{\sqrt{x}}$$ \vskip 15pt $$H(u)=\sqrt{6}u+\sqrt{5u}$$ \end{column} \end{columns} \end{frame} \begin{frame} \LARGE The Constant Multiple Rule tells us $$\dfrac{d}{dx}\left(cf(x)\right)=c \dfrac{d}{dx}\left(f(x)\right)$$ and the Product Rule says $$\dfrac{d}{dx}\left(cf(x)\right)=c\dfrac{d}{dx}\left(f(x)\right)+f(x)\dfrac{d}{dx}\left(c\right).$$ Why do these agree? \end{frame} \begin{frame} \LARGE Find the first and second derivatives. \begin{itemize} \item[\bf (a)] $f(x) = 2x^4 - 2x^3 + 4x$ \vskip 25pt \item[\bf (b)] $g(r)=\sqrt{r}+\sqrt[3]{r}$ \vskip 25pt \item[\bf (c)] $h(x)=\dfrac{x^2}{1+8x}$ \end{itemize} \end{frame} \begin{frame} \large Suppose you cut a slice of pizza from a circular pizza of radius $r$, \begin{center} \includegraphics[width=3.5cm]{circ.png} \end{center} As you change the size of the angle $\theta$, you change the area of the slice, $A=\frac{1}{2}r^2\theta$. Then $A'$ is \begin{center} (a) $r\theta$ \hf \hf \hf (b) $\frac{1}{2}r^2$ \hf \hf \hf (c) $r$ \hf \hf \hf (d) Unknowable \end{center} \end{frame} \begin{frame} Find an equation of the tangent line to the curve $$y=\frac{5x}{x+3}$$ at the point $(2,2)$. \vskip 40pt Find the points on the curve $$y=2x^3+3x^2-12x+3$$ where the tangent line is horizontal. \end{frame} \begin{frame} The equation of motion of a particle is $$s = t^3 -27t$$ where $s$ is in meters and $t$ is in seconds. (Assume $t \geq 0$.) \vskip 12pt \begin{itemize} \item[\bf (a)] Find the velocity and acceleration as functions of $t$. \vskip 12pt \item[\bf (b)] Find the acceleration when the velocity is zero. \end{itemize} \end{frame} \begin{frame} \large Use the product rule to show $$ \frac{d}{dx}(fgh)(x) = (fgh' + fhg' + ghf')(x) $$ Can you generalize this argument? ie What is the derivative of four, five, six, ... functions multiplied together? \vskip 35pt Find the derivative of $$ y=(3x+1)(2x-1)(x-2) \hskip 35pt y=(3x-2)^2(2x+3) $$ \end{frame} \begin{frame} \large Consider the function $f(x)=|x^2-25|$. \begin{enumerate} \item Sketch the graph of $f$. \item Find a formula for $f'$. \item For what values of $x$ is the function not differentiable? \end{enumerate} \end{frame} \begin{frame} \large What is the derivative of the function $f\cdot f$? What is the derivative of the function $f\cdot f\cdot f$? Can you generalize this for any positive integer $n$? What is the derivative of $(x^2+1)^6$? \end{frame} \begin{frame} \large The functions $$ y=x^2+ax+b \hskip 25pt y=cx-x^2 $$ share a tangent line at the point $(1,0)$. Find $a, b,$ and $c$. \end{frame} \end{document}