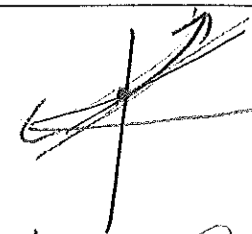
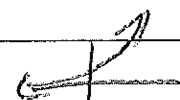
p5

Section 3.1 (Assume *f* and *g* are both differentiable.)

Definition Name	Rule/Definition	Example
Constant Rule	$\frac{d}{dx}(c)=0$	$\frac{d}{dx}(581.6) = 0$ $\frac{d}{dx}\pi = 0$
Power Rule	If n is in the Reals $\frac{d}{dx}(x^n)=nx^{n-1}$	① $\frac{d}{dx}x^6 = 6x^5$ ② $\frac{d}{dx}\sqrt[4]{x^3} = x^{3/4}$ $= \frac{3}{4}x^{-1/4} = \frac{3}{4\sqrt[4]{x}}$
Constant Multiple Rule	If c is a constant $\frac{d}{dx}[cf(x)]=$ $c\frac{d}{dx}f(x)$	$\frac{d}{dx}3x^4 = 3(x^4)$ $3(4x^3) = 12x^3$ $\frac{d}{dx}\frac{4}{\sqrt{x}} = 4x^{-1/2}$ $-2x^{-3/2} = -\frac{2}{x\sqrt{x}}$
Sum Rule	$\frac{d}{dx}[f(x)+g(x)]=$ $\frac{d}{dx}f(x)+\frac{d}{dx}g(x)$	$\frac{d}{dx}(3x^4 + \frac{2}{\sqrt{x}})$ $2x^{-1/2}$ $-1x^{-3/2}$ $12x^3 - \frac{1}{x\sqrt{x}}$ or $12x^3 - x^{-3/2}$

Difference Rule	$\frac{d}{dx}[f(x)-g(x)]=$ $\frac{d}{dx}f(x)-\frac{d}{dx}g(x)$	$\frac{d}{dx}\left(\sqrt[4]{x^3}-x^{24}\right)$ $x^{3/4}-x^{24}$ $\frac{3}{4}x^{-1/4}-24x^{23}$
e	$\lim_{h\to 0}\frac{e^h-1}{h}=1$	
Derivative of e	 $\frac{d}{dx}(e^x)=e^x$	$\frac{d}{dx}(e^x-x)$ $=e^x-1$
Normal Line	The line through P that is perpendicular to the tangent at P.	$y=x\sqrt{x}$ $(1,1)$ $y=x^{3/2}$ $y'=\frac{3}{2}x^{1/2}$ $m=y'(1)=\frac{3}{2}(1)^{1/2}=\frac{3}{2}$ tangent = $y-1=\frac{3}{2}(x-1)$ $\perp=-\frac{2}{3}$ normal = $y-1=-\frac{2}{3}(x-1)$

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