Calculus Reference Sheet

Limits			
Definition		$\lim_{x\to c} f(x) = L$	
$\lim_{x\to c}[f(x) \pm g(x)] = \lim_{x\to c} f(x) \pm \lim_{x\to c} g(x)$		$\lim_{x\to c}[f(x) \times g(x)] = \lim_{x\to c} f(x) \times \lim_{x\to c} g(x)$	
Derivatives			
Definition		$\frac{d}{dx}[f(x)] = \lim_{h\to 0} \frac{f(x+h) - f(x)}{h}$	
Rules			
Constant	$\frac{d}{dx}[c] = 0$	Single variable function	$\frac{d}{dx}[x] = 1$
Sum and difference	$\frac{d}{dx}[f(x) \pm g(x)] = f'(x) \pm g'(x)$	Power	$\frac{d}{dx}[x^n] = n \times x^{n-1}$ $\frac{d}{dx}[g(x)^n] = n(g(x))^{n-1} \times g'(x)$
Product	$\frac{d}{dx}[f(x) \times g(x)] = f(x) \times g'(x) + g(x) \times f'(x)$	Quotient	$\frac{d}{dx}\left[\frac{f(x)}{g(x)}\right] = \frac{g(x)f'(x) - f(x)g'(x)}{[g(x)]^2}$, $g'(x) \neq 0$
Chain	$f \circ g(x) = f(g(x)) = f'(g(x)) \times g'(x)$	Exponential	$\frac{d}{dx}[e^{g(x)}] = g'(x) \times e^{g(x)}$
Trig functions			
$\frac{d}{dx}[\sin\theta] = \cos\theta$	$\frac{d}{dx}[\cos\theta] = -\sin\theta$	$\frac{d}{dx}[\tan\theta] = sec^2\,\theta$	
$\frac{d}{dx}[\csc\theta] = -\csc\theta\cot\theta$	$\frac{d}{dx}[\sec\theta] = \sec\theta\tan\theta$	$\frac{d}{dx}[\cot\theta] = -csc^2\,\theta$	
Logarithms			
$\frac{d}{dx}[e^x] = e^x$		$\frac{d}{dx}[\ln x] = \frac{1}{x}, where\ x > 0$	
$\frac{d}{dx}[a^x] = a^x \times \ln a$		$\frac{d}{dx}[\log_a x] = \frac{1}{x(\ln a)}$	
Trigonometry			
Reciprocal identities	$\cot x = \frac{1}{\tan x} = \frac{\cos x}{\sin x}$	Pythagorean identities	$cos^2\theta + sin^2\theta = 1$ $1 + tan^2\,x = sec^2 x$ $1 + cot^2\,x = csc^2 x$