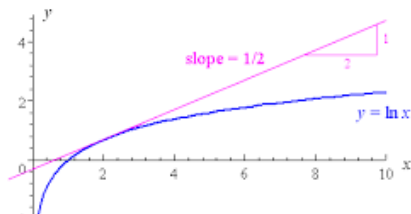


Goals

By the end of this week, you should be able to:

- Review the chain rule for differentiation of exponential functions of the forms: $y = e^x$, and $y = e^{f(x)}$
- Find the derivatives logarithmic functions of the forms: $y = \ln(x)$ and $y = \ln[f(x)]$.
- Use derivatives to solve practical problems
- Use further applications of differentiation



Theoretical Components

Summary of derivatives:

$f(x)$	$f'(x)$
c	0
ax^n	nax^{n-1}
$[g(x)]^n$	$ng'(x)[g(x)]^{n-1}$
e^x	e^x
e^{kx}	ke^{kx}
$e^{g(x)}$	$g'(x)e^{g(x)}$
$\log_e(x)$	$\frac{1}{x}$
$\log_e(kx)$	$\frac{1}{x}$
$\log_e[g(x)]$	$\frac{g'(x)}{g(x)}$
$\sin(ax)$	$a \cos(ax)$
$\cos(ax)$	$-a \sin(ax)$
$\tan(ax)$	$\frac{a}{\cos^2(ax)}$ (= $a \sec^2(ax)$)

Product rule

(a) If $y = uv$ then $\frac{dy}{dx} = u \times \frac{dv}{dx} + v \times \frac{du}{dx}$.

(b) If $f(x) = u(x) \times v(x)$ then $f'(x) = u(x) \times v'(x) + v(x) \times u'(x)$.

Quotient rule

(a) If $y = \frac{u}{v}$ then $\frac{dy}{dx} = \frac{v \times \frac{du}{dx} - u \times \frac{dv}{dx}}{v^2}$.

(b) If $f(x) = \frac{u(x)}{v(x)}$ then $f'(x) = \frac{v(x)u'(x) - u(x)v'(x)}{[v(x)]^2}$.

Practical Components

Do the following questions from **Chapter 9: Logarithmic functions using calculus** (pdf – GC). Organise your solutions neatly in your exercise book.

Ex 9.2 The derivative of $f(x) = \log_e x$

- Q's 1 – 4 (any 2 from each), 6 (all), 7, 13, 14 (a)

Investigation

In your single lesson of **week 5** (Wednesday) you are to sit an **in-class test** (worth 20% with your investigations).

It is an “open book” task given under test conditions. The questions will focus on the content from weeks 1 to 4.

Full algebraic working must be shown.

QFO

Quiz/Forum/Other

In-class this week!