Core 3

Functions

Domain - set of 'inputs' or x values

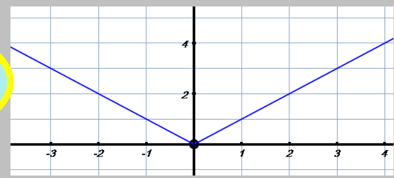
Range - set of 'outputs' or y values

Composite functions - fg(x) (put g into f)

Inverse functions - f^{-1}

- function must be 1-1
- rearrange function to get x = then interchange x & y

Modulus function



sketch **graphs** by 'bouncing up' everything beneath the x axis

solve **equations/inequalities** by first sketching graphs

Differentiation

Chain rule $\frac{dy}{dx} = \frac{dy}{du}\frac{du}{dx}$

Product rule $y = uv$

$\frac{dy}{dx} = uv' + vu'$

Quotient rule $y = \frac{u}{v}$

$\frac{dy}{dx} = \frac{vu' - uv'}{v^2}$

cos → -sin → -cos → sin → cos

$\frac{d}{dx}(\tan x) = \sec^2 x$

$\frac{d}{dx}(e^{ax}) = ae^{ax}$

$\frac{d}{dx}(\ln bx) = 1/x$

Integration

By recognition

By substitution

u = du/dx = dx/du

= dx =

replace dx and x

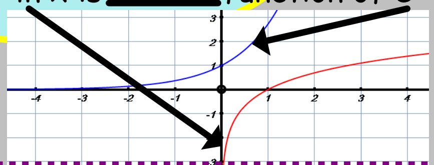
By parts $\int uv' = uv - \int vu'$

f'(x)/f(x) $\ln(f(x))$

Volumes of revolution if rotated about x axis $\pi\int y^2 dx$

e^x and logarithms

ln x is **inverse** function of e^x



Trigonometry

arcsin ($\sin^{-1}$), arccos, arctan

sec = 1/cos

cosec = 1/sin

cot = 1/tan

sin/cos = tan

$\sin^2 + \cos^2 = 1$

$1 + \tan^2 = \sec^2$

$1 + \cot^2 = \mathrm{cosec}^2$

Proof

counter example

proof

contradiction

$\Rightarrow$	only if	nec
$\Leftarrow$	if	suff
$\Leftrightarrow$	iff	n + s

Numerical methods

Locating roots - change of sign so root

Staircase and cobweb diagrams - x = g(x)

Mid-Ordinate rule

Simpsons rule

see formula book

Functions

Domain - set of 'inputs' or x values

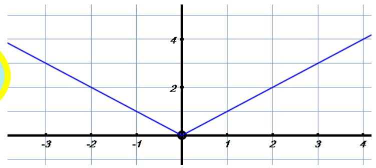
Range - set of 'outputs' or y values

Composite functions - fg(x) (put g into f)

Inverse functions - f^{-1}

- function must be 1-1
- rearrange function to get x = then interchange x & y

Modulus function



sketch **graphs** by 'bouncing up' everything beneath the x axis

solve **equations/inequalities** by first sketching graphs

Core 3

Differentiation

Chain rule $\frac{dy}{dx} = \frac{dy}{du}\frac{du}{dx}$

Product rule $y = uv$

$\frac{dy}{dx} = uv' + vu'$

Quotient rule $y = \frac{u}{v}$

$\frac{dy}{dx} = \frac{vu' - uv'}{v^2}$

sin → cos → -sin → -cos → sin

$\mathbf{d/dx}(\tan x) = \sec^2 x$

$\mathbf{d/dx}(e^{ax}) = ae^{ax}$

$\mathbf{d/dx}(\ln x) = 1/x$

Integration

By recognition

By substitution

u = du/dx = dx/du

= dx =

replace dx and x

By parts $\int uv' = uv - \int vu'$

f'(x)/f(x) ln(f(x))

Volumes of revolution if rotated about x axis $\pi\int y^2 dx$

Trigonometry

arcsin ($\sin^{-1}$), arccos, arctan

sec = 1/cos

cosec = 1/sin

cot = 1/tan

sin/cos = tan

$\sin^2 + \cos^2 = 1$

$\tan^2 + 1 = \sec^2$

$1 + \cot^2 = \mathrm{cosec}^2$

Proof

counter example

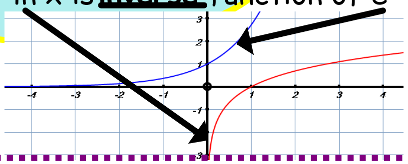
proof

contradiction

⇒	only if	nec
⇐	if	suff
⇔	iff	n + s

e^x and logarithms

ln x is **inverse** function of e^x



Numerical methods

Locating roots - change of sign so root

Staircase and cobweb diagrams - x = g(x)

Mid-Ordinate rule

Simpsons rule

see formula book