Edexcel GCE A Level Maths: C3 Summary Sheet

1. Algebraic Fractions

F(x) = Q(x) x Divisor + Remainder

2. Functions

Domain $\Rightarrow F \Rightarrow$ Range

Range $\Rightarrow F^{-1} \Rightarrow$ Domain

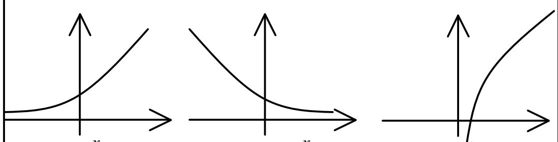
Function: Every element in the domain is mapped to exactly one element of the range.

Fg(x) mean F[g(x)], F^{-1} is the inverse, and is a reflection of F in $y = x$.

3. The Exponential

$y = a^x$ passes through (0,1) as $a^0 = 1$.

$e = 2.718..$, $y = e^x \Rightarrow dy/dx = e^x$



$y = e^x$ $y = e^{-x}$ $y = \ln x$

$\log_e x = \ln x$, $x > 0$

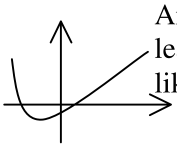
$y = \ln x$ passes through (1,0)

4. Numerical Methods

For continuous functions if f(x) undergoes a sign change in an interval then the interval has a root of the equation f(x) = 0. This can be used to prove your answer is correct to so many dp after using iteration equations. Iteration can **sometimes** be used to solve equations of the form: $x_{n+1} = g(x)$.

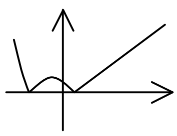
5. Transforming Graphs

$y = f(x)$



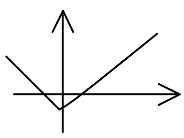
Any function. All previously learnt transformations apply like 3f(x) or f(6x + 5).

$y = |f(x)|$



y takes all the values of the function as positive, so where x is negative the graph appears to be a reflection in the line y = 0.

$y = f(|x|)$

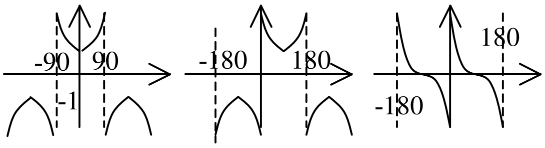


All values of x are made positive and then function f is applied to them. The resulting curve should be symmetrical in the y axis.

6. Trigonometry

$\sec\theta = 1 / \cos\theta$ $\quad \text{cosec}\,\theta = 1 / \sin\theta$

$\cot\theta = 1 / \tan\theta = \cos\theta / \sin\theta$



$y = \sec\theta$ $\quad y = \text{cosec}\,\theta$ $\quad y = \cot\theta$

$1 + \tan^2\theta = \sec^2\theta$ $\quad 1 + \cot^2\theta = \text{cosec}^2\theta$

arcsin$x$, arccos$x$ and arctan$x$ are the inverse trig. functions (reflected in $y = x$).

7. Further Trigonometry

sin(A±B) = sinAcosB ± cosAsinB

cos(A±B) = cosAcosB ∓ sinAsinB

tan(A±B) = [tanA ± tanB] / [1 ∓ tanAtanB]

Double angle formulae can be generated from those above by substituting A = B.

sin2A = 2sinAcosA These are NOT given.

$\cos 2A = \cos^2 A - \sin^2 A = 2\cos^2 A - 1$

$= 1 - 2\sin^2 A$

$\tan 2A = 2\tan A / [\,1 - \tan^2 A]$

Equations like acosθ + bsinθ = c can be solved by the R formula, but if c = 0 it is easier to use sin θ / cos θ = tan θ. Sums of sines and cosines can be expressed as multiples using the P/Q formulae which are all given in the booklet.

8. Differentiation

$dy/dx = dy/du$ x du/dx (the chain rule).

One result yields: $dx/dy = 1/[dy/dx]$.

$dy/dx = u(dv/dx) + v(du/dx)$ (for $y = uv$)

$dy/dx = [\,v(du/dx) - u(dv/dx)\,] / v^2$ (for $y = u/v$)

$e^x \Rightarrow e^x$; $e^{f(x)} \Rightarrow f'(x)e^{f(x)}$; $\ln x \Rightarrow 1/x$

$\ln[\,f(x)\,] \Rightarrow f'(x) / f(x)$; $\sin x \Rightarrow \cos x$

$\cos x \Rightarrow -\sin x$; $\tan x \Rightarrow \sec^2 x$

$\text{cosec}\,x \Rightarrow -\text{cosec}\,x\cot x$; $\sec x \Rightarrow \sec x\tan x$

$\cot x \Rightarrow -\text{cosec}^2 x$

The formulae are given except for sin and cos and the first three lines of this box. Remember if differentiating something beginning with c add a minus. If it doesn't start with c, don't.

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in June 2005.

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