Functions

The domain is what x can be

The range is what y can be

Inverse Functions

$$f^{-1}(x)$$

To find an inverse function:

1. Switch x and y
2. Rearrange to make y the subject

On a graph it is a reflection in the line $y = x$

Composite Functions

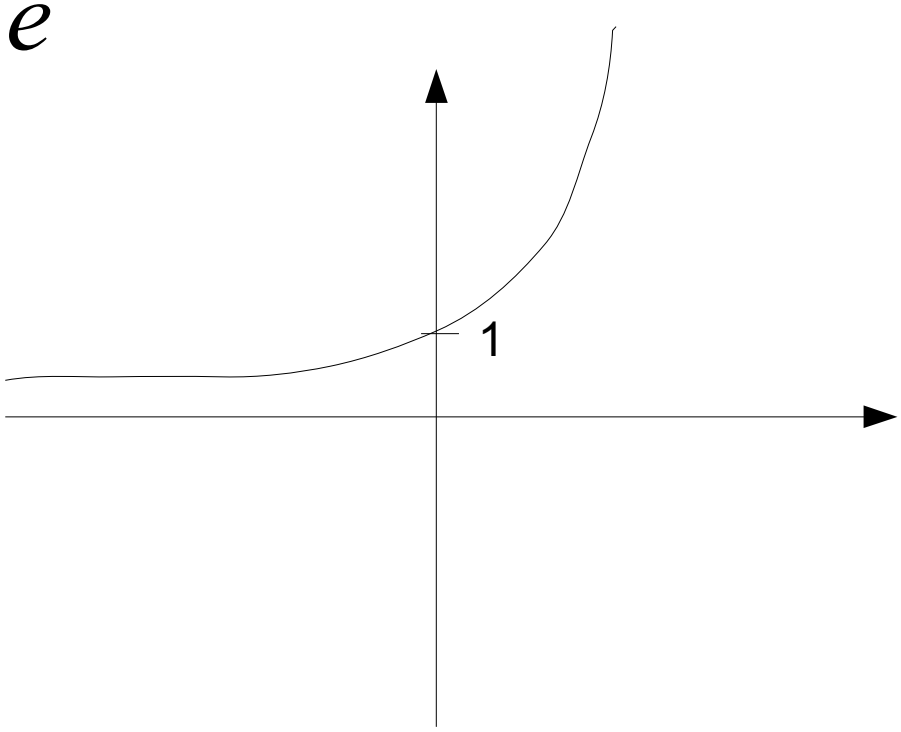
$$f(x) \quad g(x)$$

$fg(x)$ means put g into f

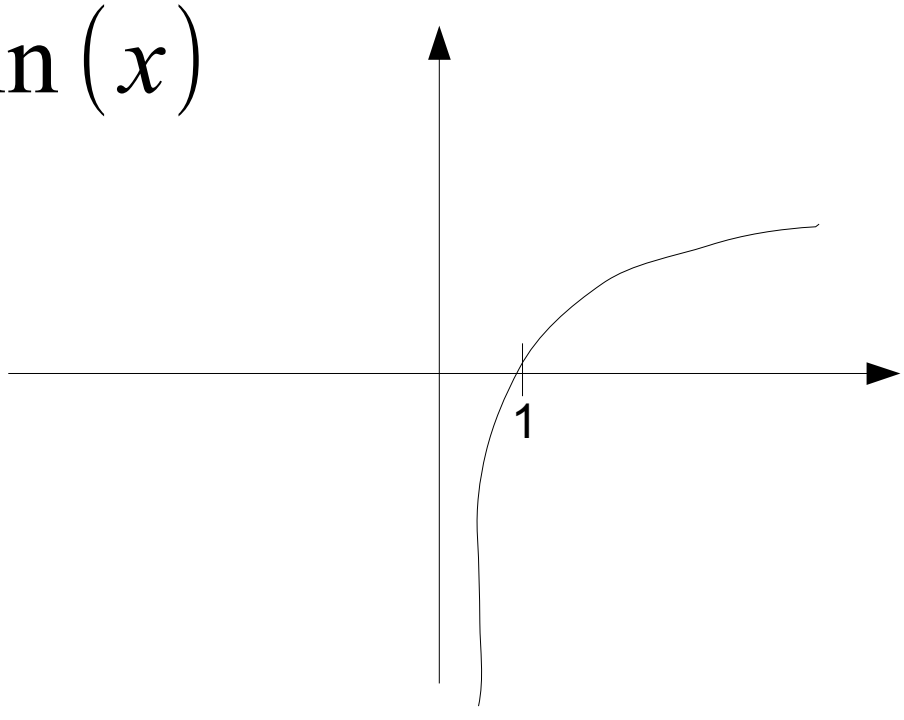
$gf(x)$ means put f into g

The Exponential and Logs

$y = e^x$



$y = \ln(x)$



$\ln(x)$ means $\log_e x$

$\ln(x)$ is the inverse of e^x

Iteration

$$U_{n+1}=\sqrt{U_n+5} \qquad U_0=2$$

$$U_1=\sqrt{(2)+5}=\sqrt{7}$$

$$U_2=\sqrt{(\sqrt{7})+5}=2.765\,(3\text{dp})$$

$$U_3=\sqrt{(ANS)+5}=2.787\,(3\text{dp})$$

$$U_4=\sqrt{(ANS)+5}=2.790\,(3\text{dp})$$

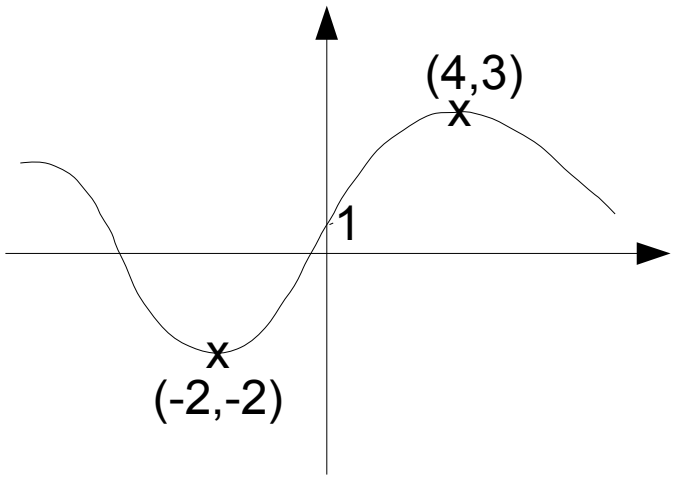
$$U_5=\sqrt{(ANS)+5}=2.791\,(3\text{dp})$$

$$U_6=\sqrt{(ANS)+5}=2.791\,(3\text{dp})$$

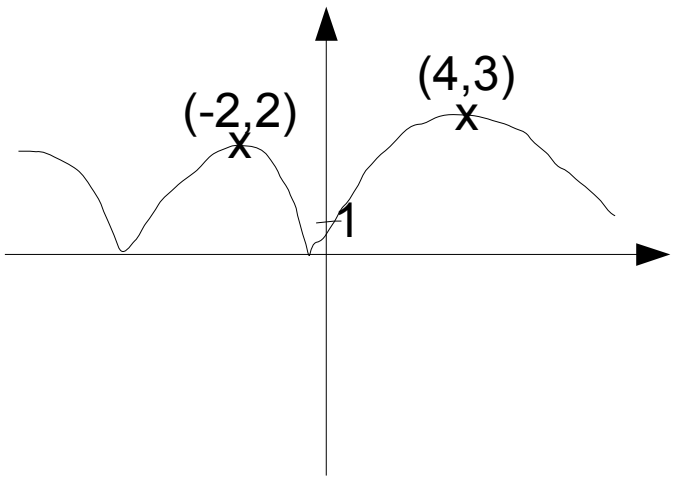
$f(x)=0$ has a solution between a and b if
$f(a)$ and $f(b)$ have different signs

Transforming Graphs

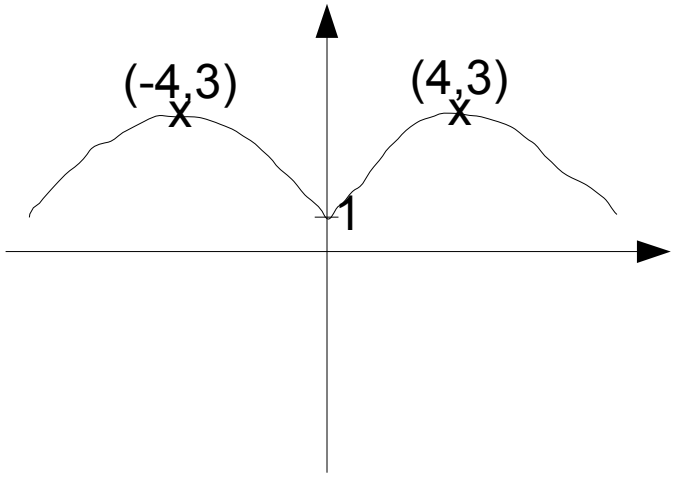
$y = f(x)$



$y = |f(x)|$



$y = f(|x|)$



Trigonometry

$$\frac{1}{\sin(\theta)} = cosec(\theta)$$

$$\frac{1}{\cos(\theta)} = sec(\theta)$$

$$\frac{1}{\tan(\theta)} = \cot(\theta)$$

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

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

$$1 + \cot^2\theta = cosec^2\theta$$

$$\sin(\theta) = \sin(180 - \theta)$$

$$\cos(\theta) = \sin(360 - \theta)$$

$$\tan(\theta) = \tan(\theta + 180)$$

Trigonometry

In the Formula Book

$$\sin(A \pm B) = sinAcosB \pm cosAsinB$$

$$\cos(A \pm B) = cosAcosB \mp sinAsinB$$

$$\tan(A \pm B) = \frac{tanA \pm tanB}{1 \mp tanAtanB}$$

Not in the Formula Book (but you can make them by substituting B for A)

$$\sin(2A) = 2\sin A\cos B$$

$$\cos(2A) = \cos^2 A - \sin^2 A$$

$$\tan(2A) = \frac{2\tan A}{1 - \tan^2 A}$$

To put something in the form

$$R\sin(\theta \pm \alpha) \text{ or } R\cos(\theta \mp \alpha):$$

-Compare to compound angle formula

-Find R using pythagoras: $R^2 = a^2 + b^2$

-Find alpha by dividing sin by cos to get tan

Differentiation

Chain Rule

$$\frac{dy}{dx} = \frac{du}{dx} \times \frac{dy}{du}$$

Product Rule

$$y = uv$$

$$\frac{dy}{dx} = v\frac{du}{dx} + u\frac{dv}{dx}$$

Quotient Rule

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

$$\frac{dy}{dx} = \frac{v\frac{du}{dx} - u\frac{dv}{dx}}{v^2}$$

Differentiation

Function	Derivative
e^x	e^x
$\ln(x)$	$\frac{1}{x}$
$\sin(x)$	$\cos(x)$
$\cos(x)$	$-\sin(x)$