mathcentre

Am y cymorth rydych ei angen i gefnogi eich cwrs

Ffeithiau a Fformwlâu

Prosiect aml-ddisgyblaethol sy'n cynnig adnoddau rhad ac am ddim i fyfyrwyr a staff i hwyluso dysgu ac addysgu mathemateg yn yr ysgol a'r brifysgol yw'r mathcentre.

Coleg Cymraeg Cenedlaethol

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Cynhyrchwyd y daflen hon ar y cyd rhwng yr Higher Education Academy Maths, Stats & OR Network a'r Coleg Cymraeg Cenedlaethol.

Am gopi electroneg, ewch i'r Porth
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sigma Σ

The Higher Education Academy Maths, Stats & OR Network

Differu

$y = f(x)$	$\frac{dy}{dx} = f'(x)$
cysonyn c	0
x^n, ar gyfer unrhyw gysonyn n	nx^{n-1}
e^x	e^x
$\ln x = \log_e x$	$\frac{1}{x}$
$\sin x$	$\cos x$
$\cos x$	$-\sin x$
$\tan x = \frac{\sin x}{\cos x}$	$\sec^2 x$
$\text{cosec}x = \frac{1}{\sin x}$	$-\text{cosec}\, x \cot x$
$\sec x = \frac{1}{\cos x}$	$\sec x \tan x$
$\cot x = \frac{\cos x}{\sin x}$	$-\text{cosec}^2 x$
$\sin^{-1} x$	$\frac{1}{\sqrt{1-x^2}}$
$\cos^{-1} x$	$\frac{-1}{\sqrt{1-x^2}}$
$\tan^{-1} x$	$\frac{1}{1+x^2}$
$\cosh x$	$\sinh x$
$\sinh x$	$\cosh x$
$\tanh x$	$\text{sech}^2 x$
$\text{sech}\, x$	$-\text{sech}\, x \tanh x$
$\text{cosech}\, x$	$-\text{cosech}\, x \coth x$
$\coth x$	$-\text{cosech}^2 x$
$\cosh^{-1} x$	$\frac{1}{\sqrt{x^2-1}}$
$\sinh^{-1} x$	$\frac{1}{\sqrt{x^2+1}}$
$\tanh^{-1} x$	$\frac{1}{1-x^2}$

Rheol llinoledd differu

$$\frac{d}{dx}(au+bv) = a\frac{du}{dx} + b\frac{dv}{dx} \qquad a, b \text{ yn gysonion}$$

Rheolau differu lluoswm a chyniferydd

$$\frac{d}{dx}(uv) = u\frac{dv}{dx} + v\frac{du}{dx} \qquad \frac{d}{dx}\left(\frac{u}{v}\right) = \frac{v\frac{du}{dx} - u\frac{dv}{dx}}{v^2}$$

Rheol gadwyn differu

Os yw $y = y(u)$ a bod $u = u(x)$, yna mae $\frac{dy}{dx} = \frac{dy}{du} \cdot \frac{du}{dx}$

Er engraifft, os yw
$y = (\cos x)^{-1}$, yna mae $\frac{dy}{dx} = -1(\cos x)^{-2}(-\sin x)$

Integru

$f(x)$	$\int f(x)\,dx = F(x) + c$	
cysonyn k	$kx + c$	
x^n, $(n \neq -1)$	$\frac{x^{n+1}}{n+1} + c$	
$x^{-1} = \frac{1}{x}$	$\ln x + c$ / $\ln(-x) + c$	$x > 0$ / $x < 0$
e^x	$e^x + c$	
$\cos x$	$\sin x + c$	
$\sin x$	$-\cos x + c$	
$\tan x$	$\ln(\sec x) + c$	$-\frac{\pi}{2} < x < \frac{\pi}{2}$
$\sec x$	$\ln(\sec x + \tan x) + c$	$-\frac{\pi}{2} < x < \frac{\pi}{2}$
$\text{cosec}\, x$	$\ln(\text{cosec}\, x - \cot x) + c$	$0 < x < \pi$
$\cot x$	$\ln(\sin x) + c$	$0 < x < \pi$
$\cosh x$	$\sinh x + c$	
$\sinh x$	$\cosh x + c$	
$\tanh x$	$\ln \cosh x + c$	
$\coth x$	$\ln \sinh x + c$	$x > 0$
$\frac{1}{x^2+a^2}$	$\frac{1}{a}\tan^{-1}\frac{x}{a} + c$	$a > 0$
$\frac{1}{x^2-a^2}$	$\frac{1}{2a}\ln\frac{x-a}{x+a} + c$	$\lvert x\rvert > a > 0$
$\frac{1}{a^2-x^2}$	$\frac{1}{2a}\ln\frac{a+x}{a-x} + c$	$\lvert x\rvert < a$
$\frac{1}{\sqrt{x^2+a^2}}$	$\sinh^{-1}\frac{x}{a} + c$	$a > 0$
$\frac{1}{\sqrt{x^2-a^2}}$	$\cosh^{-1}\frac{x}{a} + c$	$x \geqslant a > 0$
$\frac{1}{\sqrt{x^2+k}}$	$\ln(x + \sqrt{x^2+k}) + c$	
$\frac{1}{\sqrt{a^2-x^2}}$	$\sin^{-1}\frac{x}{a} + c$	$-a \leqslant x \leqslant a$
$f(ax+b)$	$\frac{1}{a}F(ax+b) + c$	$a \neq 0$
e.e. $\cos(2x-3)$	$\frac{1}{2}\sin(2x-3) + c$	

Rheol llinoledd integru

$$\int (af(x) + bg(x))\,dx = a\int f(x)\,dx + b\int g(x)\,dx, \qquad (a, b \text{ cyson})$$

Integru trwy amnewid

$$\int f(u)\frac{du}{dx}dx = \int f(u)du \quad \text{a} \quad \int_a^b f(u)\frac{du}{dx}\,dx = \int_{u(a)}^{u(b)} f(u)du$$

Integru fesul rhan

$$\int_a^b u\frac{dv}{dx}dx = [uv]_a^b - \int_a^b \frac{du}{dx}v\,dx$$

Ffurf arall

$$\int_a^b f(x)g(x)\,dx = \left[f(x)\int g(x)dx\right]_a^b - \int_a^b \frac{df}{dx}\left\{\int g(x)dx\right\}dx$$

Algebra

$$(x+k)(x-k) = x^2 - k^2$$
$$(x+k)^2 = x^2 + 2kx + k^2, \quad (x-k)^2 = x^2 - 2kx + k^2$$
$$x^3 \pm k^3 = (x \pm k)(x^2 \mp kx + k^2)$$

Fformiwla datrys hafaliad gwadratig

Os yw $ax^2 + bx + c = 0$ yna mae $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Deddfau Indecsau

$$a^m a^n = a^{m+n} \qquad \frac{a^m}{a^n} = a^{m-n} \qquad (a^m)^n = a^{mn}$$
$$a^0 = 1 \qquad a^{-m} = \frac{1}{a^m} \qquad a^{1/n} = \sqrt[n]{a} \qquad a^{\frac{m}{n}} = (\sqrt[n]{a})^m$$

Deddfau Logarithmau

I bod sail positif b $(b \neq 1)$, mae

$$\log_b A = c \quad \text{yn golygu} \quad A = b^c,$$
$$\log_b A + \log_b B = \log_b AB, \qquad \log_b A - \log_b B = \log_b \frac{A}{B},$$
$$n \log_b A = \log_b A^n, \qquad \log_b 1 = 0, \qquad \log_b b = 1.$$

Fformwla cyfnewid sail: $\log_a x = \frac{\log_b x}{\log_b a}$

Dynodir logarithmau i'r sail e gan $\log_e$ neu ln a gelwir hwy'n *logarithmau naturiol*. Mae'r llythyren e yn cynrhychioli cysonyn esbonyddol sydd oddeutu 2.718.

Ffracsiynau rhannol

Ar gyfer *ffracsiynau bondrwm* $\frac{P(x)}{Q(x)}$, lle mae P a Q yn bolynomialau ac mae gradd P yn llai na gradd Q:

Mae *ffactor llinol* $ax+b$ yn yr enwadur yn rhoi ffracsiwn rhannol â'r ffurf $\frac{A}{ax+b}$.

Mae *ffactorau llinol ailadroddus* $(ax+b)^2$ yn yr enwadur yn rhoi ffracsiynau rhannol â'r ffurf $\frac{A}{ax+b} + \frac{B}{(ax+b)^2}$.

Mae *ffactor gwadratig* ax^2+bx+c yn yr enwadur yn rhoi ffracsiwn rhannol â'r ffurf $\frac{Ax+B}{ax^2+bx+c}$.

Mae *ffracsiynau pendrwm* angen term ychwanegol sy'n bolynomial â gradd $n-d$; n yw gradd y rhifiadur a d yw gradd yr enwadur.

Anhafaleddau

Mae $a > b$ yn golygu a yn fwy na b.
Mae $a < b$ yn golygu a yn llai na b.
Mae $a \geqslant b$ yn golygu a yn fwy na neu'n hafal i b.
Mae $a \leqslant b$ yn golygu a yn llai na neu'n hafal i b.

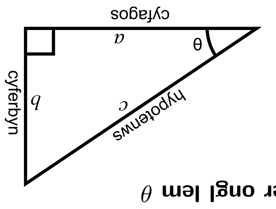
Trigonometreg

Graddau a radianau

$$360° = 2\pi \text{ radian}, \quad 1° = \frac{2\pi}{360} = \frac{\pi}{180} \text{ radian}$$
$$1 \text{ radian} = \frac{180}{\pi} \text{ gradd} \approx 57.3°$$

Cymharebau trigonometrig ar gyfer ongl lem θ

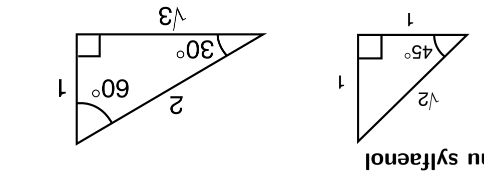
$$\sin\theta = \frac{\text{ochr gyferbyn i } \theta}{\text{hypotenws}} = \frac{b}{c}$$
$$\cos\theta = \frac{\text{ochr gyfagos i } \theta}{\text{hypotenws}} = \frac{a}{c}$$
$$\tan\theta = \frac{\text{ochr gyferbyn i } \theta}{\text{ochr gyfagos i } \theta} = \frac{b}{a}$$



Theorem Pythagoras

$$a^2 + b^2 = c^2$$

Trionglau sylfaenol



$$\sin 45° = \frac{1}{\sqrt{2}}, \quad \cos 45° = \frac{1}{\sqrt{2}}, \quad \tan 45° = 1$$
$$\sin 30° = \frac{1}{2}, \quad \cos 30° = \frac{\sqrt{3}}{2}, \quad \tan 30° = \frac{1}{\sqrt{3}}$$
$$\sin 60° = \frac{\sqrt{3}}{2}, \quad \cos 60° = \frac{1}{2}, \quad \tan 60° = \sqrt{3}$$

Mynegiadau trigonometrig cyffredin

$\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$
$\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$
$\tan(A \pm B) = (\tan A \pm \tan B) / (1 \mp \tan A \tan B)$
$2\sin A \cos B = \sin(A+B) + \sin(A-B)$
$2\cos A \cos B = \cos(A-B) + \cos(A+B)$
$2\sin A \sin B = \cos(A-B) - \cos(A+B)$
$\sin^2 A + \cos^2 A = 1$
$1 + \cot^2 A = \text{cosec}^2 A, \quad \tan^2 A + 1 = \sec^2 A$
$\cos 2A = \cos^2 A - \sin^2 A = 2\cos^2 A - 1 = 1 - 2\sin^2 A$
$\sin 2A = 2\sin A \cos A$
$\sin^2 A = \frac{1}{2}(1 - \cos 2A), \quad \cos^2 A = \frac{1}{2}(1 + \cos 2A)$

$\sin^2 A$ yw'r nodiant ar gyfer $(\sin A)^2$ ac mae $\cos^2 A = (\cos A)^2$ ayyb. Mae'r nodiant yma'n cael ei ddefnyddio ar gyfer ffwythiannau trigonometrig a hyperbolig â phwerau cyfanrifol positif yn unig.

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Ffwythiannau hyperbolig

$$\cosh x = \frac{e^x + e^{-x}}{2}, \qquad \sinh x = \frac{e^x - e^{-x}}{2}$$
$$\tanh x = \frac{\sinh x}{\cosh x} = \frac{e^x - e^{-x}}{e^x + e^{-x}}$$
$$\text{sech}\, x = \frac{1}{\cosh x} = \frac{2}{e^x + e^{-x}}$$
$$\text{cosech}\, x = \frac{1}{\sinh x} = \frac{2}{e^x - e^{-x}}$$
$$\coth x = \frac{\cosh x}{\sinh x} = \frac{1}{\tanh x} = \frac{e^x + e^{-x}}{e^x - e^{-x}}$$

Mynegiadau hyperbolig

$e^x = \cosh x + \sinh x, \quad e^{-x} = \cosh x - \sinh x$
$\cosh^2 x - \sinh^2 x = 1$
$1 - \tanh^2 x = \text{sech}^2 x$
$\coth^2 x - 1 = \text{cosech}^2 x$
$\sinh(x \pm y) = \sinh x \cosh y \pm \cosh x \sinh y$
$\cosh(x \pm y) = \cosh x \cosh y \pm \sinh x \sinh y$
$\sinh 2x = 2\sinh x \cosh x$
$\cosh 2x = \cosh^2 x + \sinh^2 x$
$\cosh^2 x = \frac{1}{2}(\cosh 2x + 1)$
$\sinh^2 x = \frac{1}{2}(\cosh 2x - 1)$

Ffwythiannau gwrthdro hyperbolig

$\cosh^{-1} x = \ln(x + \sqrt{x^2 - 1})$ ar gyfer $x \geqslant 1$
$\sinh^{-1} x = \ln(x + \sqrt{x^2 + 1})$
$\tanh^{-1} x = \frac{1}{2}\ln\left(\frac{1+x}{1-x}\right)$ ar gyfer $-1 < x < 1$

Gwyddor Roegaidd

A	α	alffa	I	ι	iota	P	ρ	rho
B	β	beta	K	κ	capa	Σ	σ	sigma
Γ	γ	gama	Λ	λ	lambda	T	τ	táw
Δ	δ	delta	M	μ	mw	Υ	υ	upsilon
E	ϵ	epsilon	N	ν	nw	Φ	ϕ	ffi
Z	ζ	seta	Ξ	ξ	csi	X	χ	chi
H	η	eta	O	o	omicron	Ψ	ψ	psi
Θ	θ	theta	Π	π	pi	Ω	ω	omega

Ysgrifennwyd yn wreiddiol gan Tony Croft a Geoff Simpson ar gyfer Canolfan Gefnogi Dysgu Mathemateg ym Mhrifysgol Loughborough.
Cyfieithwyd gan Tudur Davies i'r Coleg Cymraeg Cenedlaethol.
Cysodiad a chelfwaith gan yr awduron

Rhifau Cymhlyg

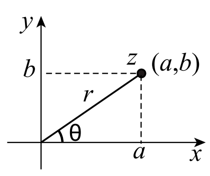
Ffurf Cartesaidd: $z = a + bj$ ar gyfer $j = \sqrt{-1}$

Ffurf Polar:

$z = r(\cos\theta + j\sin\theta) = r\angle\theta$

$a = r\cos\theta, \quad b = r\sin\theta,$

$\tan\theta = \frac{b}{a}$



Ffurf Esbonyddol:

$z = re^{j\theta}$

Perthnasau Euler

$e^{j\theta} = \cos\theta + j\sin\theta, \quad e^{-j\theta} = \cos\theta - j\sin\theta$

Lluosiad a rhaniad mewn ffurf polar

$$z_1 z_2 = r_1 r_2 \angle(\theta_1 + \theta_2), \qquad \frac{z_1}{z_2} = \frac{r_1}{r_2}\angle(\theta_1 - \theta_2)$$

Os yw $z = r\angle\theta$, yna mae $z^n = r^n\angle(n\theta)$

Theorem De Moivre

$$(\cos\theta + j\sin\theta)^n = \cos n\theta + j\sin n\theta$$

Y berthynas rhwng ffwythiannau 'trig' a hyperbolig

$\cos jx = \cosh x, \quad \sin jx = j\sinh x$

$\cosh jx = \cos x, \quad \sinh jx = j\sin x$

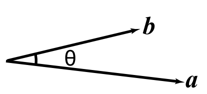
Gellir defnyddio i yn hytrach na j i ddynodi $\sqrt{-1}$.

Fectorau

Os yw $\mathbf{r} = x\mathbf{i} + y\mathbf{j} + z\mathbf{k}$ yna mae $|\mathbf{r}| = \sqrt{x^2 + y^2 + z^2}$

Lluoswm Scalar

$\mathbf{a} \cdot \mathbf{b} = |\mathbf{a}|\,|\mathbf{b}|\cos\theta$

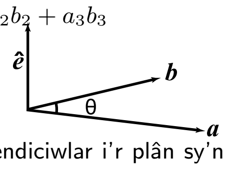


Os yw $\mathbf{a} = a_1\mathbf{i} + a_2\mathbf{j} + a_3\mathbf{k}$ a $\mathbf{b} = b_1\mathbf{i} + b_2\mathbf{j} + b_3\mathbf{k}$ yna mae

$$\mathbf{a} \cdot \mathbf{b} = a_1 b_1 + a_2 b_2 + a_3 b_3$$

Lluoswm Fector

$\mathbf{a} \times \mathbf{b} = |\mathbf{a}|\,|\mathbf{b}|\sin\theta\,\hat{\mathbf{e}}$



Mae ê yn fector uned sy'n berpendiciwlar i'r plân sy'n cynnwys **a** a **b** mewn modd y gellir ei ddiffinio gan y rheol sgriw llaw dde.

Os yw $\mathbf{a} = a_1\mathbf{i} + a_2\mathbf{j} + a_3\mathbf{k}$ a $\mathbf{b} = b_1\mathbf{i} + b_2\mathbf{j} + b_3\mathbf{k}$ yna mae

$$\mathbf{a} \times \mathbf{b} = (a_2 b_3 - a_3 b_2)\mathbf{i} + (a_3 b_1 - a_1 b_3)\mathbf{j} + (a_1 b_2 - a_2 b_1)\mathbf{k} = \begin{vmatrix} \mathbf{i} & \mathbf{j} & \mathbf{k} \\ a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \end{vmatrix}.$$

Dilyniannau a Chyfresi

Dilyniant rhifyddol: $a, a+d, a+2d, \ldots$

a yw'r term cyntaf, d yw'r gwahaniaeth cyffredin,

y k^{fed} term yw $a + (k-1)d$.

Swm n term, $S_n = \frac{n}{2}(2a + (n-1)d)$.

Swm yr n cyfanrif cyntaf

$$1 + 2 + 3 + \ldots + n = \sum_{k=1}^{n} k = \frac{1}{2}n(n+1)$$

Swm sgwariau'r n cyfanrif cyntaf

$$1^2 + 2^2 + 3^2 + \ldots + n^2 = \sum_{k=1}^{n} k^2 = \frac{1}{6}n(n+1)(2n+1)$$

Dilyniant Geometrig: $a, ar, ar^2, \ldots$

a yw'r term cyntaf, r yw'r gymhareb gyffredin,

y k^{fed} term yw ar^{k-1}.

Swm n term, $S_n = \frac{a(1-r^n)}{1-r}$, gan gymryd bod $r \neq 1$.

Swm cyfres geometrig anfeidrol:

$S_\infty = \frac{a}{1-r}, \quad -1 < r < 1$

Theorem binomial

Os yw n yn gyfanrif positif, yna mae

$$(1+x)^n = 1 + nx + \frac{n(n-1)}{2!}x^2 + \frac{n(n-1)(n-2)}{3!}x^3 + \ldots + x^n.$$

Os yw n yn negatif neu'n ffracsiynol, yna mae'r gyfres yn anfeidrol a'n cydgyfeirio ar gyfer $-1 < x < 1$ yn unig.

Ehangiadau sylfaenol i ddilyniannau pŵer

$$e^x = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \ldots \text{ ar gyfer pob } x,$$

$$\sin x = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \ldots \text{ ar gyfer pob } x,$$

$$\cos x = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \ldots \text{ ar gyfer pob } x,$$

$$\log_e(1+x) = x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \ldots \text{ ar gyfer } -1 < x \leqslant 1 \text{ yn unig.}$$

Y ffwythiant esbonyddol fel terfyn dilyniant

$$\lim_{n\to\infty}\left(1 + \frac{x}{n}\right)^n = e^x.$$

Matricsau a Determinantau

Mae'r matrics $A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$ yn un 2×2 sydd â determinant

$$|A| = \begin{vmatrix} a & b \\ c & d \end{vmatrix} = ad - bc.$$

Mae'r matrics $A = \begin{pmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{pmatrix}$ yn un 3×3 sydd â determinant

$$|A| = a_{11}\begin{vmatrix} a_{22} & a_{23} \\ a_{32} & a_{33} \end{vmatrix} - a_{12}\begin{vmatrix} a_{21} & a_{23} \\ a_{31} & a_{33} \end{vmatrix} + a_{13}\begin{vmatrix} a_{21} & a_{22} \\ a_{31} & a_{32} \end{vmatrix}$$

(wedi'i ehangu ar hyd y rhes gyntaf).

Gwrthdro matrics 2×2

Os yw $A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$ yna mae $A^{-1} = \frac{1}{ad-bc}\begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$

cyn belled bod $ad - bc \neq 0$.

Lluosiad matrics: Lluosir dau fatrics 2×2 fel

$$\begin{pmatrix} a & b \\ c & d \end{pmatrix}\begin{pmatrix} \alpha & \gamma \\ \beta & \delta \end{pmatrix} = \begin{pmatrix} a\alpha + b\beta & a\gamma + b\delta \\ c\alpha + d\beta & c\gamma + d\delta \end{pmatrix}$$

Cofiwch fod $AB \neq BA$ heblaw mewn achosion arbennig.

Cyfernodau Binomial

Cyfernod y term x^k yn yr ehangiad binomial i $(1+x)^n$, lle mae n yn gyfanrif positif, yw $\binom{n}{k}$ neu ${}^nC_k$:

$$\binom{n}{k} = \frac{n!}{k!(n-k)!} = \binom{n}{n-k},$$

$0! = 1, \quad n! = n(n-1)!$.

Felly, mae $4! = 1.2.3.4$, er engraifft.

Gweler batrwm y cyfernodau yn y

Triongl Pascal:

```
            1     1
         1     2     1
      1     3     3     1
   1     4     6     4     1
1     5    10    10     5     1
⋮     ⋮     ⋮     ⋮     ⋮     ⋮     ⋮
```

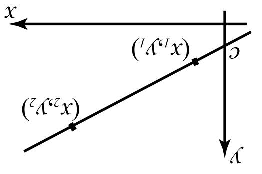
${}^nC_k$ yw'r nifer o is-setiau gyda k elfen y gellir eu dewis o set gyda n elfen i gyd.

Graffiau ffwythiannau cyffredin

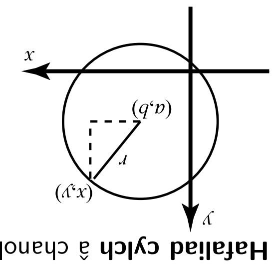
Llinol

$y = mx + c$, m yw'r graddiant, c yw'r rhyngdoriad fertigol.

$m = (y_2 - y_1)\,/\,(x_2 - x_1)$

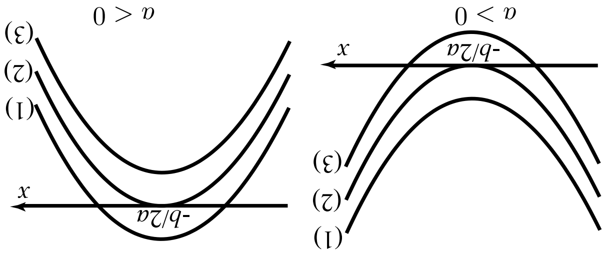


Hafaliad cylch â chanol (a, b), radiws r



$$(x-a)^2 + (y-b)^2 = r^2$$

Ffwythiant Cwadratig $y = ax^2 + bx + c$



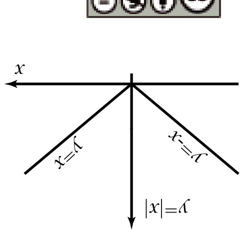
$a > 0$	$a < 0$
(1) $b^2 - 4ac < 0$	(1) $b^2 - 4ac > 0$
(2) $b^2 - 4ac = 0$	(2) $b^2 - 4ac = 0$
(3) $b^2 - 4ac > 0$	(3) $b^2 - 4ac < 0$

Cwblhau'r sgwâr

Os yw $a \neq 0, \quad ax^2 + bx + c = a\left(x + \frac{b}{2a}\right)^2 + \frac{4ac - b^2}{4a}$

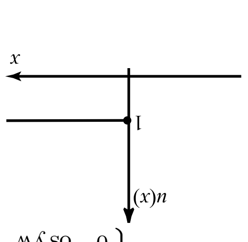
Ffwythiant modwlws

$$|x| = \begin{cases} x & \text{os yw } x \geqslant 0 \\ -x & \text{os yw } x < 0 \end{cases}$$

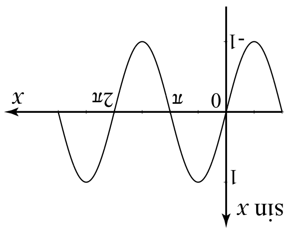


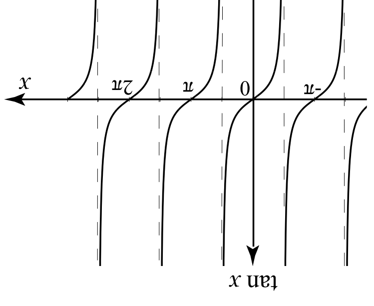
Ffwythiant step uned, $u(x)$

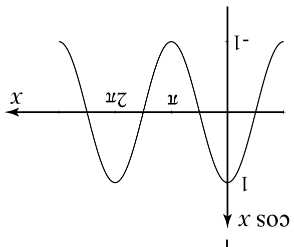
$$u(x) = \begin{cases} 1 & \text{os yw } x \geqslant 0 \\ 0 & \text{os yw } x < 0 \end{cases}$$



Ffwythiannau Trigonometrig

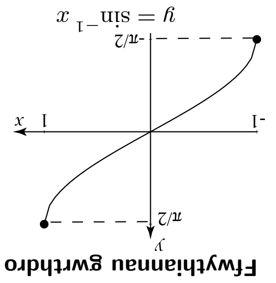




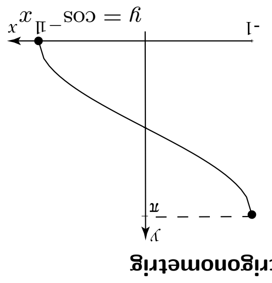


Mae'r ffwythiannau sin a cosin yn gyfnodol gyda chyfnod 2π a'r ffwythiant tangiad yn gyfnodol â chyfnod π.

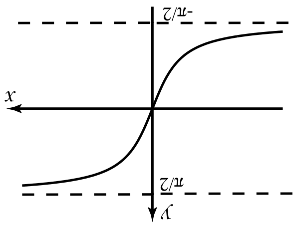
Ffwythiannau gwrthdro trigonometrig



$y = \sin^{-1} x$



$y = \cos^{-1} x$



$y = \tan^{-1} x$

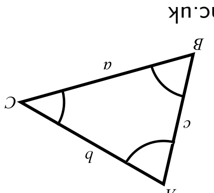
Rheolau sin a cosin

Rheol sin

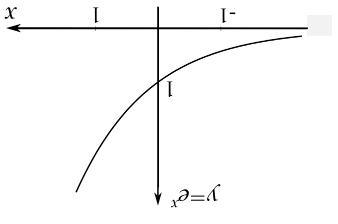
$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

Rheol cosin

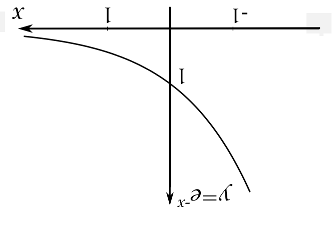
$$a^2 = b^2 + c^2 - 2bc\cos A$$



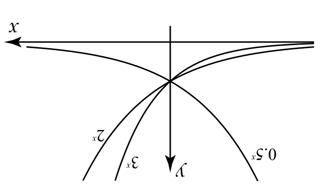
Ffwythiannau Esbonyddol



Graff $y = e^x$ yn dangos twf esbonyddol.

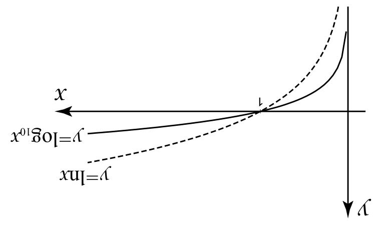


Graff $y = e^{-x}$ yn dangos dirywiad esbonyddol.



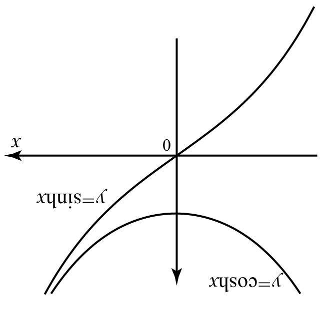
Graffiau $y = 0.5^x$, $y = 3^x$, a $y = 2^x$

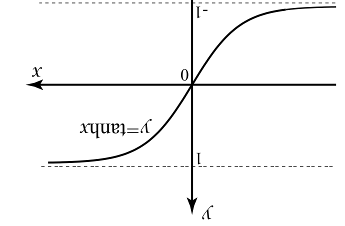
Ffwythiannau logarithmig



Graffiau $y = \ln x$ a $y = \log_{10} x$.

Ffwythiannau hyperbolig





Graffiau $y = \sinh x$, $y = \cosh x$ a $y = \tanh x$.