GONIOMETRISCHE

Definities	
cos a	$=\frac{e^{ia}+e^{-ia}}{2}$
sin a	$=\frac{e^{ia}-e^{-ia}}{2i}$

Rechtstreekse gevolgen		
e^{ia}	$=\cos a + i\sin a$	
tan a	$= i\frac{e^{ia} - e^{-ia}}{e^{ia} + e^{-ia}} = i\frac{e^{2ia} - 1}{e^{2ia} + 1}$	

Hoofdformule en afgeleide formules $\cos^{2} a + \sin^{2} a = 1$ $1 + \tan^{2} a = \frac{1}{\cos^{2} a}$ $\cot an^{2} a + 1 = \frac{1}{\sin^{2} a}$

Som- en verschilformules	
$\cos(\boldsymbol{a}-\boldsymbol{b})$	$=\cos a\cos b + \sin a\sin b$
$\cos(\boldsymbol{a} + \boldsymbol{b})$	$=\cos a\cos b - \sin a\sin b$
$\sin(\boldsymbol{a}-\boldsymbol{b})$	$=\sin a\cos b - \cos a\sin b$
$\sin(\boldsymbol{a} + \boldsymbol{b})$	$=\sin a\cos b + \cos a\sin b$
$\tan(\boldsymbol{a}-\boldsymbol{b})$	$= \frac{\tan \mathbf{a} - \tan \mathbf{b}}{1 + \tan \mathbf{a} \tan \mathbf{b}}$
$\tan(\boldsymbol{a} + \boldsymbol{b})$	$= \frac{\tan \mathbf{a} + \tan \mathbf{b}}{1 - \tan \mathbf{a} \tan \mathbf{b}}$

Productformules: dubbele hoek		
sin 2 a	$= 2 \sin \mathbf{a} \cos \mathbf{a}$	
cos 2 a	$=\cos^2 \mathbf{a} - \sin^2 \mathbf{a}$	
	$=2\cos^2\mathbf{a}-1$	
	$=1-2\sin^2 a$	
tan 2 a	$= \frac{2 \tan \mathbf{a}}{1 - \tan^2 \mathbf{a}}$	

Productformules: halve hoek		
$\cos \frac{a}{2}$	$=\pm\sqrt{\frac{1+\cos a}{2}}$	
$\sin \frac{a}{2}$	$=\pm\sqrt{\frac{1-\cos a}{2}}$	
$\tan \frac{\mathbf{a}}{2}$	$=\pm\sqrt{\frac{1-\cos\boldsymbol{a}}{1+\cos\boldsymbol{a}}}$	

D	De formules van Simpson		
1	$\sin a + \sin b$	$= 2\sin\frac{\boldsymbol{a}+\boldsymbol{b}}{2}\cos\frac{\boldsymbol{a}-\boldsymbol{b}}{2}$	
	$\sin a - \sin b$	$=2\cos\frac{\boldsymbol{a}+\boldsymbol{b}}{2}\sin\frac{\boldsymbol{a}-\boldsymbol{b}}{2}$	
	$\cos a + \cos b$	$=2\cos\frac{a+b}{2}\cos\frac{a-b}{2}$	
	$\cos a - \cos b$	$=-2\sin\frac{a+b}{2}\sin\frac{a-b}{2}$	
2	$\sin \mathbf{a} \cdot \cos \mathbf{b}$	$=\frac{1}{2}\big[\sin(\boldsymbol{a}+\boldsymbol{b})+\sin(\boldsymbol{a}-\boldsymbol{b})\big]$	
	$\cos a \cdot \cos b$	$=\frac{1}{2}[\cos(\boldsymbol{a}+\boldsymbol{b})+\cos(\boldsymbol{a}-\boldsymbol{b})]$	
	$\sin \mathbf{a} \cdot \sin \mathbf{b}$	$=\frac{1}{2}\left[\cos(\boldsymbol{a}-\boldsymbol{b})-\cos(\boldsymbol{a}+\boldsymbol{b})\right]$	

Goniometrische getallen van belangrijke hoeken

	0 0°	<u>p</u> 6 30°	<u>p</u> 4 45°	<u>p</u> 3 60°	<u>p</u> 2 90°
sin	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1
cos	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0
tan	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	∞

T-formules $(t = \tan \frac{a}{2})$

sin a	$=\frac{2t}{1+t^2}$
cos a	$=\frac{1-t^2}{1+t^2}$
tan a	$=\frac{2t}{1-t^2}$

Formule Le Moivre

$(\cos a + i \sin a)^n$	$=\sin(n\mathbf{a})+i(\cos n.a)$

Om snel $\sin(n\mathbf{a})$ en/of $\cos(n\mathbf{a})$ te berekenen, kan je gewoon het linkerlid uitwerken en dan reël en imaginair scheiden.

HYPERBOLISCHE

Definities	
cosh <i>a</i>	$=\frac{e^a+e^{-a}}{2}$
sinh a	$=\frac{e^a-e^{-a}}{2}$

Rechtstreekse gevolgen		
e^a	$= \cosh a + \sinh a$	
tanh a	$= \frac{e^{a} - e^{-a}}{e^{a} + e^{-a}} = \frac{e^{2a} - 1}{e^{2a} + 1}$	

Hoofdformule en afgeleide formules $\frac{\cosh^2 a - \sinh^2 a}{1 - \tanh^2 a} = \frac{1}{\cosh^2 a}$ $\coth^2 a - 1 = \frac{1}{\sinh^2 a}$

Som- en verschilformules	
$\cosh(\boldsymbol{a} - \boldsymbol{b})$	$= \cosh \mathbf{a} \cosh \mathbf{b} - \sinh \mathbf{a} \sinh \mathbf{b}$
$\cosh(\boldsymbol{a} + \boldsymbol{b})$	$= \cosh \mathbf{a} \cosh \mathbf{b} + \sinh \mathbf{a} \sinh \mathbf{b}$
$sinh(\boldsymbol{a}-\boldsymbol{b})$	$= \sinh \mathbf{a} \cosh \mathbf{b} - \cosh \mathbf{a} \sinh \mathbf{b}$
$sinh(\boldsymbol{a} + \boldsymbol{b})$	$= \sinh \mathbf{a} \cosh \mathbf{b} + \cosh \mathbf{a} \sinh \mathbf{b}$
$tanh(\boldsymbol{a}-\boldsymbol{b})$	_ tanh \boldsymbol{a} — tanh \boldsymbol{b}
	$-\frac{1}{1-\tanh a}$ tanh b
tanh(a + b)	$_{-}$ tanh a + tanh b
	$\frac{1}{1+\tanh a}$ tanh b

Productformules: dubbele hoek		
sinh 2 a	$= 2 \sinh \mathbf{a} \cosh \mathbf{a}$	
cosh 2a	$= \cosh^2 \mathbf{a} + \sinh^2 \mathbf{a}$	
	$= 2 \cosh^2 \mathbf{a} - 1$	
	$= 1 + 2 \sinh^2 \mathbf{a}$	
tanh 2 a	$= \frac{2 \tanh \mathbf{a}}{1 + \tanh^2 \mathbf{a}}$	

Productformules: halve hoek		
$ \cosh \frac{\mathbf{a}}{2} $	$=\pm\sqrt{\frac{\cosh a+1}{2}}$	
$\sinh \frac{a}{2}$	$=\pm\sqrt{\frac{\cosh \mathbf{a}-1}{2}}$	
$ tanh \frac{a}{2} $	$=\pm\sqrt{\frac{\cosh \mathbf{a}-1}{\cosh \mathbf{a}+1}}$	

D	De formules van Simpson		
1	$\sinh a + \sinh b$	$= 2\sinh\frac{a+b}{2}\cosh\frac{a-b}{2}$	
	$\sinh a - \sinh b$	$= 2\cosh\frac{\boldsymbol{a}+\boldsymbol{b}}{2}\sinh\frac{\boldsymbol{a}-\boldsymbol{b}}{2}$	
	$ \cosh \mathbf{a} + \cosh \mathbf{b} $	$= 2\cosh\frac{a+b}{2}\cosh\frac{a-b}{2}$	
	$ \cosh \mathbf{a} - \cosh \mathbf{b} $	$= 2\sin\frac{\boldsymbol{a}+\boldsymbol{b}}{2}\sin\frac{\boldsymbol{a}-\boldsymbol{b}}{2}$	
2	$\sinh a \cdot \cosh b$	$= \frac{1}{2} \left[\sinh(\boldsymbol{a} + \boldsymbol{b}) + \sinh(\boldsymbol{a} - \boldsymbol{b}) \right]$	
	$\cosh \boldsymbol{a} \cdot \cosh \boldsymbol{b}$	$= \frac{1}{2} \left[\cosh(\boldsymbol{a} + \boldsymbol{b}) + \cosh(\boldsymbol{a} - \boldsymbol{b}) \right]$	
	$\sinh \mathbf{a} \cdot \sinh \mathbf{b}$	$= \frac{1}{2} \left[\cosh(\boldsymbol{a} + \boldsymbol{b}) - \cosh(\boldsymbol{a} - \boldsymbol{b}) \right]$	

T-formules ($t = \tanh \frac{a}{2}$)		
sinh a	-2t	
	$\left -\frac{1-t^2}{1-t^2} \right $	
cosh a	$-1+t^2$	
	$\left -\frac{1}{1-t^2} \right $	
tanh a	$=\frac{2t}{1+t^2}$	

hyperbolische functies		
$\sin(i\boldsymbol{a})$	i.sinh a	
$\cos(i.a)$	cosh a	
tan(i.a)	i. tanh a	
$\sinh(i.a)$	i.sin a	
cosh(i.a)	cos a	
tanh(<i>i.a</i>)	i, tan a	

Verband tussen goniometrische en

Ln-vorm van inverse hyperbolische functies $\operatorname{arccosh} a = \ln(a + \sqrt{a^2 - 1})$ $\operatorname{arcsinh} a = \ln(a + \sqrt{a^2 + 1})$ $\operatorname{arctanh} a = \frac{1}{2}\ln\left(\frac{1+a}{1-a}\right)$