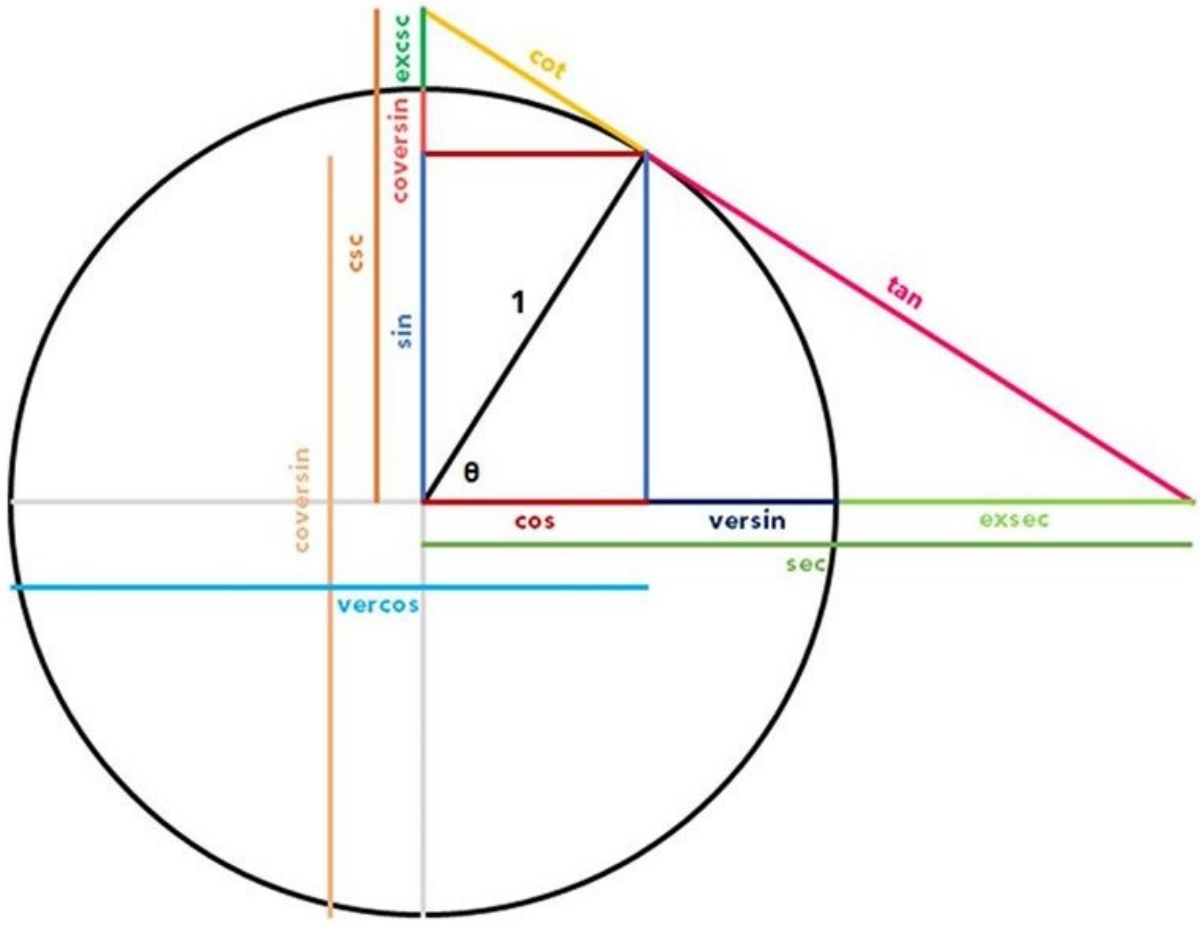
Historical Trigonometric Functions

These trigonometric functions were used before calculators to simplify and increase accuracy of computations when log tables were used to perform multiplication or other operations.



1. versine
2. vercosine
3. coversine
4. covercosine
5. haversine
6. havercosine
7. hacoversine
8. hacovercosine
9. exsecant
10. excosecant

Prefixes: "ver" - versed, "co" - complementary, "ha" - halved

Functions

Versine:	versin(θ)=1-cos(θ)
Vercosine:	vercosin(θ)=1+cos(θ)
Coversine:	coversin(θ)=1-sin(θ)
Covercosine:	covercosin(θ)=1+sin(θ)
Haversine:	haversin(θ)=versin(θ)/2
Havercosine:	havercosin(θ)=vercosin(θ)/2
Hacoversine:	hacoversin(θ)=coversin(θ)/2

Hacovercosine:	hacovercosin(θ)=covercosin(θ)/2
Exsecant:	exsec(θ)=sec(θ)-1
Excosecant:	excsc(θ)=csc(θ)-1

Inverse Functions

Arcversine:	arcversin(y)=arccos(1-y)
Arcvercosine:	arcvercos(y)=arccos(y-1)
Arccoversine:	arccoversin(y)=arcsin(1-y)
Arccovercosine:	arccovercos(y)=arcsin(y-1)
Archaversine:	archaversin(y)=arccos(1-2y)
Archavercosine:	archavercos(y)=arccos(2y-1)
Archacoversine:	archhacoversin(y)=arcsin(1-2y)
Archacovercosine:	archhacovercos(y)=arcsin(2y-1)

For more information, see:
https://en.wikipedia.org/wiki/Versine

NBASIC Function Definitions

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REM ALL ANGLES ARE IN RADIANS
REM PREFIXES: VER-VERSED, CO-COMPLIMENTARY, HA-HALVED, EX-EXTERIOR
REM VERSINE (VER)
REM USE ALTERNATE FORMULA FOR MORE ACCURACY WITH SMALL ANGLES
DEF FN VER(A)=2*SIN(A/2)^2
REM VERCOSINE (VCS)
REM USE ALTERNATE FORMULA FOR MORE ACCURACY WITH SMALL ANGLES
DEF FN VCS(A)=2*COS(A/2)^2
REM COVERSINE (CVS)
DEF FN CVS(A)=FN VER(PI/2-A)
REM COVERCOSINE (CVC)
DEF FN CVC(A)=FN VCS(PI/2-A)
REM HAVERSINE (HAV)
DEF FN HAV(A)=FN VER(A)/2
REM HAVERCOSINE (HVC)
DEF FN HVC(A)=FN VCS(A)/2
REM HACOVERSINE (HCV)
DEF FN HCV(A)=FN CVS(A)/2
REM HACOVERCOSINE (HCC)
DEF FN HCC(A)=FN CVC(A)/2
REM EXSECANT (EXS)
DEF FN EXS(A)=FN VER(A)*SEC(A)
REM EXCOSECANT (EXC)
DEF FN EXC(A)=FN VCS(A)*CSC(A)
REM CHORD (CRD)
DEF FN CRD(A)=2*SIN(A/2)

REM ARCVERSINE (AVER)
DEF FN AVER(Y)=ACOS(1-Y)
REM ARCVERCOSINE (AVCS)
DEF FN AVCS(Y)=ACOS(Y-1)
REM ARCCOVERSINE (ACVS)
DEF FN ACVS(Y)=ASIN(1-Y)
REM ARCCOVERCOSINE (ACVC)
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DEF FN ACVC(Y)=ASIN(Y-1)
REM ARCHAVERSINE (AHAV)
DEF FN AHAV(Y)=2*ASIN(SQRT(Y))
REM ARCHAVERCOSINE (AHVC)
DEF FN AHVC(Y)=2*ACOS(SQRT(Y))
REM ARCHACOVERSINE (AHCV)
DEF FN AHCV(Y)=ASIN(1-2*Y)
REM ARCHACOVERCOSINE (AHCC)
DEF FN AHCC(Y)=ASIN(2*Y-1)
REM ARCEXSECANT (AEXS)
DEF FN AEXS(Y)=ACOS(1/(Y+1))
REM ARCEXCOSECANT (AEXC)
DEF FN AEXC(Y)=ASIN(1/(Y+1))
REM ARCCHORD (ACRD)
DEF FN ACRD(Y)=2*ASIN(Y/2)
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