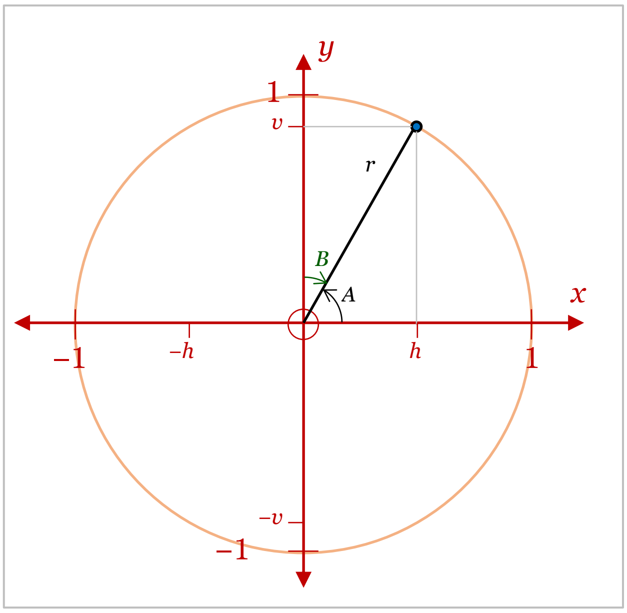
Trigonometric functions of angles in each quadrant

1. First quadrant



Functions of reference angle A:

$\sin(A) = v/r$	$\cos(A) = h/r$	$\tan(A) = v/h$
$\text{cosec}(A) = 1/\sin(A) = r/v$	$\sec(A) = 1/\cos(A) = r/h$	$\cot(A) = 1/\tan(A) = h/v$

Functions of complementary angle B:

$\sin(90°-B) = \cos(B) = v/r$ $= \sin(A)$	$\cos(90°-B) = \sin(B) = h/r$ $= \cos(A)$	$\tan(90°-B) = \cot(B) = v/h$ $= \tan(A)$
$\text{cosec}(90°-B) = \sec(B) = r/v$ $= \text{cosec}(A)$	$\sec(90°-B) = \text{cosec}(B) = r/h$ $= \sec(A)$	$\cot(90°-B) = \tan(B) = h/v$ $= \cot(A)$

Note: $A + B = 90°$ by definition of complementary angles.

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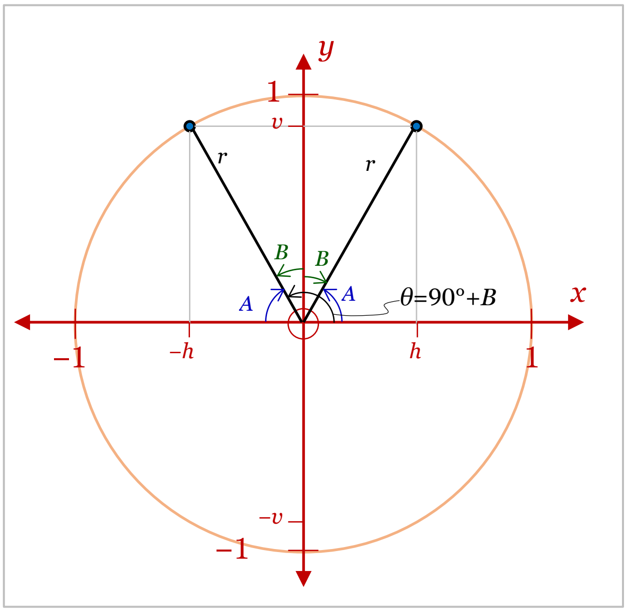
2. Second quadrant



Functions of reference angle A:

$\sin(180°-A)$ $= \sin(A) = v/r$	$\cos(180°-A)$ $= -\cos(A) = -h/r$	$\tan(180°-A)$ $= -\tan(A) = -v/h$
$\text{cosec}(180°-A)$ $= 1/\sin(180°-A)$ $= \text{cosec}(A) = 1/\sin(A) = r/v$	$\sec(180°-A)$ $= 1/\cos(180°-A)$ $= -\sec(A) = -1/\cos(A) = -r/h$	$\cot(180°-A)$ $= 1/\tan(180°-A)$ $= -\cot(A) = -1/\tan(A) = -h/v$

Functions of complementary angle B:

$\sin(90°+B)$ $= \cos(B) = v/r$ $= \sin(180°-A)$	$\cos(90°+B)$ $= -\sin(B) = -h/r$ $= \cos(180°-A)$	$\tan(90°+B)$ $= -\cot(B) = -v/h$ $= \tan(180°-A)$
$\text{cosec}(90°+B)$ $= \sec(B) = r/v$ $= \text{cosec}(180°-A)$	$\sec(90°+B)$ $= -\text{cosec}(B) = -r/h$ $= \sec(180°-A)$	$\cot(90°+B)$ $= -\tan(B) = -h/v$ $= \cot(180°-A)$

Note: $A + B = 90°$, by definition of complementary angles.

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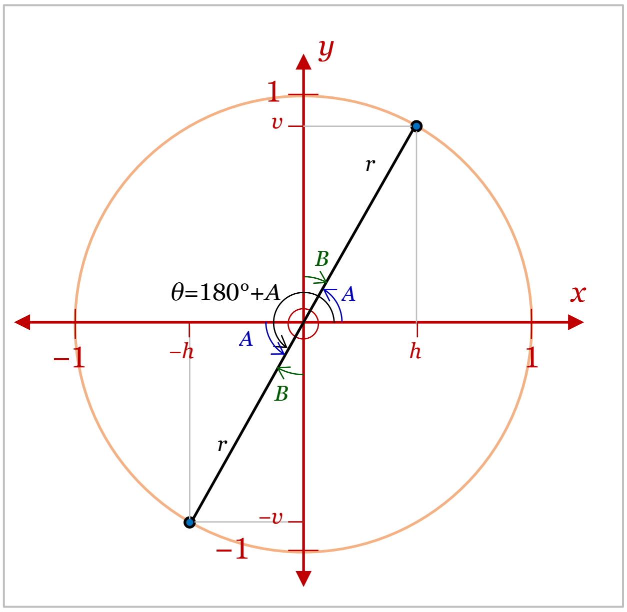
3. Third quadrant



Functions of reference angle A:

$\sin(180°+A)$ $= -\sin(A) = -v/r$	$\cos(180°+A)$ $= -\cos(A) = -h/r$	$\tan(180°+A)$ $= \tan(A) = v/h$
$\text{cosec}(180°+A)$ $= 1/\sin(180°-A)$ $= -\text{cosec}(A) = -1/\sin(A) = -r/v$	$\sec(180°+A)$ $= 1/\cos(180°-A)$ $= -\sec(A) = -1/\cos(A) = -r/h$	$\cot(180°+A)$ $= 1/\tan(180°-A)$ $= \cot(A) = 1/\tan(A) = h/v$

Functions of complementary angle B:

$\sin(90°+B)$ $= -\cos(B) = -v/r$ $= \sin(180°-A)$	$\cos(90°+B)$ $= -\sin(B) = -h/r$ $= \cos(180°-A)$	$\tan(90°+B)$ $= \cot(B) = v/h$ $= \tan(180°-A)$
$\text{cosec}(90°+B)$ $= -\sec(B) = -r/v$ $= \text{cosec}(180°-A)$	$\sec(90°+B)$ $= -\text{cosec}(B) = -r/h$ $= \sec(180°-A)$	$\cot(90°+B)$ $= \tan(B) = h/v$ $= \cot(180°-A)$

Note: $A + B = 90°$, by definition of complementary angles.

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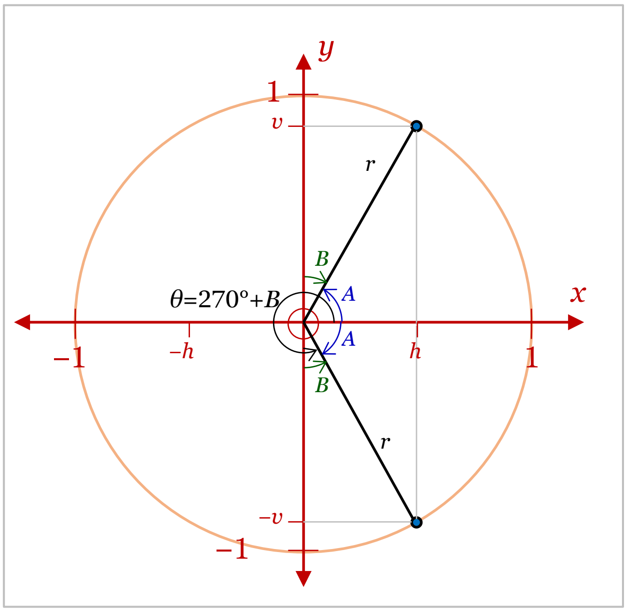
4. Fourth quadrant



Functions of reference angle A:

$\sin(360°-A)$ $= -\sin(A) = -v/r$	$\cos(360°-A)$ $= \cos(A) = h/r$	$\tan(360°-A)$ $= -\tan(A) = -v/h$
$\text{cosec}(360°-A)$ $= 1/\sin(360°-A)$ $= -\text{cosec}(A) = -1/\sin(A) = -r/v$	$\sec(360°-A)$ $= 1/\cos(360°-A)$ $= \sec(A) = 1/\cos(A) = r/h$	$\cot(360°-A)$ $= 1/\tan(360°-A)$ $= -\cot(A) = -1/\tan(A) = -h/v$

Functions of complementary angle B:

$\sin(270°+B)$ $= -\cos(B) = -v/r$ $= \sin(360°-A)$	$\cos(270°+B)$ $= \sin(B) = h/r$ $= \cos(360°-A)$	$\tan(270°+B)$ $= -\cot(B) = -v/h$ $= \tan(360°-A)$
$\text{cosec}(270°+B)$ $= -\sec(B) = -r/v$ $= \text{cosec}(360°-A)$	$\sec(270°+B)$ $= \text{cosec}(B) = r/h$ $= \sec(360°-A)$	$\cot(270°+B)$ $= -\tan(B) = -h/v$ $= \cot(360°-A)$

Note: $A + B = 90°$, by definition of complementary angles.

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