Without a calculator determine the value of...

$$\frac{2\cos 180 + \sin 135}{\cos^2(-330)}$$

Working Backwards

S	A	$\theta = 180 - \theta_R$	$\theta = \theta_R$	$\theta = \pi - \theta_R$	$\theta = \theta_R$
T	C	$\theta = 180 + \theta_R$	$\theta = 360 - \theta_R$	$\theta = \pi + \theta_R$	$\theta = 2\pi - \theta_R$

Questions from Homework

Solving Trigonometric Equations

$2\cos\theta + 1 = 0$ in the domain $0° \le \theta \le 360°$

$\frac{2\cos\theta}{2} = \frac{-1}{2}$

$\cos\theta = \frac{-1}{2}$

$\theta_R = 60°$

$\cos\theta$ is negative in Q2 + Q3

Q2	Q3
$\theta = 180 - 60°$	$\theta = 180 + 60°$
$\boxed{\theta = 120°}$	$\boxed{\theta = 240°}$

$\sin^2\theta - 1 = 0$ in the domain $0 \le \theta \le 2\pi$

$\sin^2\theta = 1$

$\sin\theta = \pm 1$

$\boxed{\theta = \frac{\pi}{2}, \frac{3\pi}{2}}$

Approximate

$\sin\theta = 0.32$ express your answers to the nearest tenth of a degree

$\theta = \sin^{-1}(0.32)$

$\theta = 18.7°$ (Degrees)

$\sin\theta$ is positive in Q1 + Q2

Q1	Q2
$\theta = 18.7°$	$\theta = 180 - 18.7°$
	$\theta = 161.3°$
$18.7° \pm 360°n$ $n \in N$	$161.3 \pm 360°n$, $n \in N$

Homework

① $\sin\theta = \frac{\sqrt{3}}{2}$

$\theta_R = \frac{\pi}{3}$

sinθ is positive in

Q 1	Q2
$\theta = \theta_R$	$\theta = \pi - \theta_R$
$\boxed{\theta = \frac{\pi}{3}}$	$\theta = \pi - \frac{\pi}{3}$
	$\theta = \frac{3\pi}{3} - \frac{\pi}{3}$
	$\boxed{\theta = \frac{2\pi}{3}}$

② $\cos\theta = -\frac{\sqrt{2}}{2}$

$\theta_R = \frac{\pi}{4}$

cosθ is negative in:

Q2	Q3
$\theta = \pi - \theta_R$	$\theta = \pi + \theta_R$
$\theta = \pi - \frac{\pi}{4}$	$\theta = \pi + \frac{\pi}{4}$
$\theta = \frac{4\pi}{4} - \frac{\pi}{4}$	$\theta = \frac{4\pi}{4} + \frac{\pi}{4}$
$\theta = \frac{3\pi}{4}$	$\theta = \frac{5\pi}{4}$

Questions from Homework

(12) $\tan\theta = \text{undefined}$ $\quad 0 \le \theta \le 2\pi$

$\theta = \frac{\pi}{2}, \frac{3\pi}{2}$

Backside

(8) $2\sin\theta + 1 = 0$

$2\sin\theta = -1$

$\sin\theta = -\frac{1}{2}$

$\theta_R = 30°$

← Answer in Degrees:

$\sin\theta$ is "-" in Q3 + Q4

Q3	Q4
$\theta = 180° + \theta_R$	$\theta = 360° - \theta_R$
$\theta = 180° + 30°$	$\theta = 360° - 30°$
$\theta = 210°$	$\theta = 330°$
$\boxed{210° \pm 360°n, n \in N}$	$\boxed{330° \pm 360°n, n \in N}$

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(6) b) $\sec\theta = -1.046$, $\quad -360° \le \theta < 360°$

→ $\cos\theta = -\frac{1}{1.046}$

$\cos\theta = -0.956$

$\theta_R = \cos^{-1}(0.956)$

$\theta_R = 17°$

$\cos\theta/\sec\theta$ are "-" in Q2, Q3

Q2	Q3
$\theta = 180° - 17°$	$\theta = 180° + 17°$
$\boxed{\theta = 163°}$	$\boxed{\theta = 197°}$
$\theta = 163° - 360°$	$\theta = 197° - 360°$
$\boxed{\theta = -197°}$	$\boxed{\theta = -163°}$

7 b) $\csc\theta = 2$ $\quad -2\pi \le \theta < 2\pi$

→ $\sin\theta = \frac{1}{2}$

$\theta_R = \frac{\pi}{6}$

Q1	Q2
$\theta = \theta_R$	$\theta = \pi - \theta_R$
$\boxed{\theta = \frac{\pi}{6}}$	$\theta = \pi - \frac{\pi}{6}$
	$\boxed{\theta = \frac{5\pi}{6}}$
$\theta = \frac{\pi}{6} - 2\pi$	$\theta = \frac{5\pi}{6} - 2\pi$
$\boxed{\theta = -\frac{11\pi}{6}}$	$\boxed{\theta = -\frac{7\pi}{6}}$

Solving Trigonometric Equations

Solve each trigonometric equation in the specified domain.

a) $5 \sin \theta + 2 = 1 + 3 \sin \theta$, $0 \leq \theta < 2\pi$

b) $3 \csc x - 6 = 0$, $0° \leq x < 360°$

a) $5\sin\theta + 2 = 1 + 3\sin\theta$, $0 \leq \theta < 2\pi$

$5\sin\theta - 3\sin\theta = 1 - 2$

$2\sin\theta = -1$

$\sin\theta = -\frac{1}{2}$

$\theta_R = \frac{\pi}{6}$

Q3	Q4
$\theta = \pi + \theta_R$	$\theta = 2\pi - \theta_R$
$\theta = \pi + \frac{\pi}{6}$	$\theta = 2\pi - \frac{\pi}{6}$
$\boxed{\theta = \frac{7\pi}{6}}$	$\boxed{\theta = \frac{11\pi}{6}}$

Solving Trigonometric Equations

Factor to Solve a Trigonometric Equation

Solve for θ.

$\tan^2\theta - 5\tan\theta + 4 = 0,\ 0 \le \theta < 2\pi$

Give solutions as exact values where possible. Otherwise, give approximate angle measures, to the nearest thousandth of a radian.

$\tan^2\theta - 5\tan\theta + 4 = 0$

$(\tan\theta - 1)(\tan\theta - 4) = 0$

$-1 \times -4 = 4$

$-1 + -4 = -5$

$\tan\theta - 1 = 0$

$\tan\theta = 1$

$\theta_R = \frac{\pi}{4}$

Q1	Q3
$\theta = \frac{\pi}{4}$	$\theta = \frac{5\pi}{4}$

$\tan\theta - 4 = 0$

$\tan\theta = 4$

$\theta = \tan^{-1}(4)$

$\theta = 1.325$ ← Q1 = θ_R

Q1	Q3
$\theta = 1.325$	$\theta = \pi + 1.325$ $\theta = 4.465$

Homework

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Solving Trigonometric Equations

$$\cos^2\theta - \frac{1}{2}\cos\theta = 0, \quad -360° \le \theta \le 720°$$

$$\sin^2\theta - \frac{\sqrt{3}}{2}\sin\theta = 0, \quad -360° \le \theta \le 360°$$

$$2\sin^2\theta + \sin\theta - 1 = 0 \qquad 0 \le \theta \le 360$$

$$2\cos^2\theta - 7\cos\theta + 3 = 0,\ 0 \le \theta \le 360$$