MATH 12

Sec. 6.3 – SOLUTIONS

(19) $\cos 570^\circ = \cos 210^\circ$ (SUBTRACTING 360°)

1) $\bar\theta = 210^\circ - 180^\circ = 30^\circ$

2) $\cos 30^\circ = \frac{\sqrt3}{2}$

3) $\cos 210^\circ = \boxed{-\frac{\sqrt3}{2}}$ (SINCE $\cos\theta < 0$ IN Q. III)

(21) $\tan 750^\circ = \tan 30^\circ = \boxed{\frac{1}{\sqrt3}} = \boxed{\frac{\sqrt3}{3}}$ (SUBTRACTING 720°)

(22) $\cos 660^\circ = \cos 300^\circ$ (SUBTRACTING 360°)

1) $\bar\theta = 360^\circ - 300^\circ = 60^\circ$

2) $\cos 60^\circ = \frac12$

3) $\cos 300^\circ = \boxed{\frac12}$ (SINCE $\cos\theta > 0$ IN Q. IV)

OR $\cos 660^\circ = \cos(-60^\circ)$ (SUBTRACTING 720°)

$= \cos 60^\circ = \boxed{\frac12}$

(24) $\sin \frac{5\pi}{3}$

1) $\bar\theta = 2\pi - \frac{5\pi}{3} = \frac{\pi}{3}$

2) $\sin\frac{\pi}{3} = \sin 60^\circ = \frac{\sqrt3}{2}$

3) $\sin\frac{5\pi}{3} = \boxed{-\frac{\sqrt3}{2}}$ (SINCE $\sin\theta < 0$ IN Q. IV)

OR $\sin\frac{5\pi}{3} = \left(\sin\left(-\frac{\pi}{3}\right)\right)$ (SUBTRACTING 2π)

$= -\sin\frac{\pi}{3} = -\sin 60^\circ = \boxed{-\frac{\sqrt3}{2}}$

(26) $\cos\frac{7\pi}{3} = \cos\frac{\pi}{3} = \boxed{\frac12}$ (SUBTRACTING 2π)

(28) $\tan\frac{5\pi}{6}$

1) $\bar\theta = \pi - \frac{5\pi}{6} = \frac{\pi}{6}$

2) $\tan\frac{\pi}{6} = \tan 30^\circ = \frac{1}{\sqrt3} = \frac{\sqrt3}{3}$

3) $\tan\frac{5\pi}{6} = \boxed{-\frac{1}{\sqrt3}} = \boxed{-\frac{\sqrt3}{3}}$ (SINCE $\tan\theta < 0$ IN Q. II)

(34) $\sin\frac{11\pi}{6}$

1) $\bar\theta = 2\pi - \frac{11\pi}{6} = \frac{\pi}{6}$

2) $\sin\frac{\pi}{6} = \sin 30^\circ = \frac12$

3) $\sin\frac{11\pi}{6} = \boxed{-\frac12}$ (SINCE $\sin\theta < 0$ IN Q. IV)

OR $\sin\frac{11\pi}{6} = \sin\left(-\frac{\pi}{6}\right)$ (SUBTRACTING 2π)

$= -\sin\frac{\pi}{6} = -\sin 30^\circ = \boxed{-\frac12}$

(53) $\theta = \frac{\pi}{3}$

a) $\underline{\sin 2\theta} = \sin\frac{2\pi}{3}$ 1) $\bar\theta = \pi - \frac{2\pi}{3} = \frac{\pi}{3}$ 2) $\sin\frac{\pi}{3} = \frac{\sqrt3}{2}$ 3) $\sin\frac{2\pi}{3} = \boxed{\frac{\sqrt3}{2}}$ (SINCE $\sin\theta > 0$ IN Q. II)

$\underline{2\sin\theta} = 2\sin\frac{\pi}{3} = 2\left(\frac{\sqrt3}{2}\right) = \boxed{\sqrt3}$

b) $\underline{\sin\frac12\theta} = \sin\frac{\pi}{6} = \boxed{\frac12}$

$\underline{\frac12\sin\theta} = \frac12\sin\frac{\pi}{3} = \frac12\cdot\frac{\sqrt3}{2} = \boxed{\frac{\sqrt3}{4}}$

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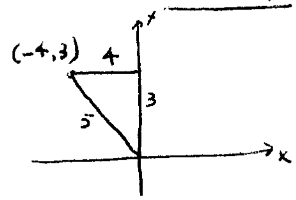
(45) $\sin\theta = \frac{3}{5}$, θ in Q. II $\csc\theta = \frac{1}{\sin\theta} = \boxed{\frac{5}{3}}$

$\cos^2\theta = 1 - \sin^2\theta = 1 - \frac{9}{25} = \frac{16}{25}$ so $\cos\theta = \boxed{-\frac{4}{5}}$ (since $\cos\theta < 0$ in Q. II)

$\sec\theta = \frac{1}{\cos\theta} = \boxed{-\frac{5}{4}}$, $\tan\theta = \frac{\sin\theta}{\cos\theta} = \frac{3/5}{-4/5} = \boxed{-\frac{3}{4}}$, $\cot\theta = \frac{1}{\tan\theta} = \boxed{-\frac{4}{3}}$

OR use $\sin\theta = \frac{y}{r} = \frac{3}{5}$, so let $y = 3$ and $r = 5$:



$\cos\theta = \frac{x}{r} = \boxed{-\frac{4}{5}}$, $\tan\theta = \frac{y}{x} = \boxed{-\frac{3}{4}}$, $\csc\theta = \frac{1}{\sin\theta} = \boxed{\frac{5}{3}}$

$\sec\theta = \frac{1}{\cos\theta} = \boxed{-\frac{5}{4}}$, $\cot\theta = \frac{1}{\tan\theta} = \boxed{-\frac{4}{3}}$

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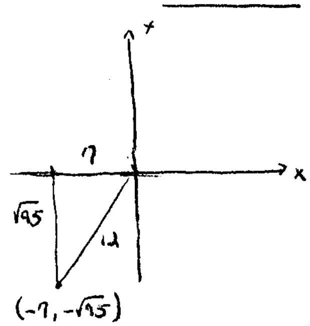
(46) $\cos\theta = -\frac{7}{12}$, θ in Q. III $\sec\theta = \frac{1}{\cos\theta} = \boxed{-\frac{12}{7}}$

$\sin^2\theta = 1 - \cos^2\theta = 1 - \frac{49}{144} = \frac{95}{144}$ so $\sin\theta = \boxed{-\frac{\sqrt{95}}{12}}$ (since $\sin\theta < 0$ in Q. III)

$\csc\theta = \frac{1}{\sin\theta} = \boxed{-\frac{12}{\sqrt{95}}}$, $\tan\theta = \frac{\sin\theta}{\cos\theta} = \frac{-\sqrt{95}/12}{-7/12} = \boxed{\frac{\sqrt{95}}{7}}$, $\cot\theta = \frac{1}{\tan\theta} = \boxed{\frac{7}{\sqrt{95}}}$

OR use $\cos\theta = \frac{x}{r} = -\frac{7}{12}$, so let $x = -7$ and $r = 12$:



$\sin\theta = \frac{y}{r} = \boxed{-\frac{\sqrt{95}}{12}}$, $\tan\theta = \frac{y}{x} = \boxed{\frac{\sqrt{95}}{7}}$, $\sec\theta = \frac{1}{\cos\theta} = \boxed{-\frac{12}{7}}$

$\csc\theta = \frac{1}{\sin\theta} = \boxed{-\frac{12}{\sqrt{95}}}$, $\cot\theta = \frac{1}{\tan\theta} = \boxed{\frac{7}{\sqrt{95}}}$

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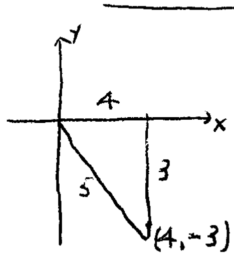
(47) $\tan\theta = -\frac{3}{4}$, $\cos\theta > 0$ $\cot\theta = \frac{1}{\tan\theta} = \boxed{-\frac{4}{3}}$

$\sec^2\theta = 1 + \tan^2\theta = 1 + \frac{9}{16} = \frac{25}{16}$, so $\sec\theta = \boxed{\frac{5}{4}}$ (since $\sec\theta = \frac{1}{\cos\theta} > 0$)

$\cos\theta = \frac{1}{\sec\theta} = \boxed{\frac{4}{5}}$, $\sin\theta = \tan\theta\cos\theta = \left(-\frac{3}{4}\right)\left(\frac{4}{5}\right) = \boxed{-\frac{3}{5}}$, $\csc\theta = \frac{1}{\sin\theta} = \boxed{-\frac{5}{3}}$

OR $\tan\theta = \frac{y}{x} = -\frac{3}{4}$, so let $x = 4$ and $y = -3$ (since θ is in Q. IV).



$\cos\theta = \frac{x}{r} = \boxed{\frac{4}{5}}$, $\sin\theta = \frac{y}{r} = \boxed{-\frac{3}{5}}$, $\cot\theta = \frac{1}{\tan\theta} = \boxed{-\frac{4}{3}}$

$\sec\theta = \frac{1}{\cos\theta} = \boxed{\frac{5}{4}}$, $\csc\theta = \frac{1}{\sin\theta} = \boxed{-\frac{5}{3}}$