

Section 7.1 Trigonometric Functions of Real Nos. - Solutions

2. a) $\cos\left(\frac{2\pi}{3}\right) = -\frac{1}{2}$ b) $\sin\left(\frac{2\pi}{3}\right) = \frac{\sqrt{3}}{2}$
 b) $\cos\left(-\frac{2\pi}{3}\right) = -\frac{1}{2}$ d) $\sin\left(-\frac{2\pi}{3}\right) = -\frac{\sqrt{3}}{2}$

4. a) $\cos\left(\frac{13\pi}{4}\right) = -\frac{1}{\sqrt{2}}$ b) $\cos\left(-\frac{13\pi}{4}\right) = -\frac{1}{\sqrt{2}}$ c) $\sin\left(\frac{13\pi}{4}\right) = -\frac{1}{\sqrt{2}}$
 d) $\sin\left(-\frac{13\pi}{4}\right) = \frac{1}{\sqrt{2}}$

10. a) $\sin t = \frac{1}{2}$ $t = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{13\pi}{6}, \frac{17\pi}{6}$
 b) $\sin t = -\frac{1}{2}$ $t = \frac{7\pi}{6}, \frac{11\pi}{6}, \frac{19\pi}{6}, \frac{23\pi}{6}$
 c) $\sin t = \frac{1}{2}$ $t = -\frac{7\pi}{6}, -\frac{11\pi}{6}, -\frac{19\pi}{6}, -\frac{23\pi}{6}$
 d) $\sin t = -\frac{1}{2}$ $t = -\frac{\pi}{6}, -\frac{5\pi}{6}, -\frac{13\pi}{6}, -\frac{17\pi}{6}$

12. a) 0.55 $\sin(0.55) = .52$ $\cos(0.55) = .85$ $\tan(0.55) = .61$
 $\csc(0.55) = 1.91$ $\sec(0.55) = 1.17$ $\cot(0.55) = 1.63$
 b) -0.55 $\sin(-0.55) = -.52$ $\cos(-0.55) = .85$ $\tan(-0.55) = -.61$
 $\csc(-0.55) = -1.91$ $\sec(-0.55) = 1.17$ $\cot(-0.55) = -1.63$

15. $\sin^2 t + \cos^2 t = 1$

a) $t = \frac{\pi}{3}$ $\left(\sin\left(\frac{\pi}{3}\right)\right)^2 + \left(\cos\left(\frac{\pi}{3}\right)\right)^2 = \left(\frac{\sqrt{3}}{2}\right)^2 + \left(\frac{1}{2}\right)^2 = 1$

b) $t = \frac{5\pi}{4}$ $\left(\sin\left(\frac{5\pi}{4}\right)\right)^2 + \left(\cos\left(\frac{5\pi}{4}\right)\right)^2 = \left(-\frac{1}{\sqrt{2}}\right)^2 + \left(-\frac{1}{\sqrt{2}}\right)^2 = 1$

c) $t = -53$ $\left(\sin(-53)\right)^2 + \left(\cos(-53)\right)^2 = (-.3954)^2 + (-.91828)^2 = 1$

16. $\tan^2 t + 1 = \sec^2 t$

a) $t = \frac{3\pi}{4}$ $\left(\tan\left(\frac{3\pi}{4}\right)\right)^2 + 1 = (-1)^2 + 1 = 2$ $\sec^2\left(\frac{3\pi}{4}\right) = (\sqrt{2})^2 = 2$

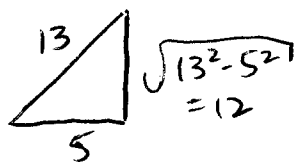
b) $t = -\frac{2\pi}{3}$ $\left(\tan\left(-\frac{2\pi}{3}\right)\right)^2 + 1 = (\sqrt{3})^2 + 1 = 4$ $\sec^2\left(-\frac{2\pi}{3}\right) = 2^2 = 4$

c) $t = \sqrt{5}$ $\left(\tan\sqrt{5}\right)^2 + 1 = (-1.27455)^2 + 1 = 2.62449$
 $\sec^2\sqrt{5} = (-1.62003)^2 = 2.62449$

23. $t = \frac{\pi}{6}$ $\cos\left(2\left(\frac{\pi}{6}\right)\right) = \cos\frac{\pi}{3} = \frac{1}{2} \neq 2$

26. $\cos t = \frac{5}{13}$ $\frac{3\pi}{2} < t < 2\pi$

$\sin t = -\frac{12}{13}$



or $\left(\frac{5}{13}\right)^2 + \sin^2 t = 1$

$\sin^2 t = 1 - \frac{25}{169} = \frac{144}{169}$

$\sin t = \pm \frac{12}{13}$ (Quad IV)
 so neg.

$\tan t = -\frac{12}{5}$

31. $x = 3\sin\theta \quad \sqrt{9-x^2} = \sqrt{9-9\sin^2\theta} = 3\sqrt{1-\sin^2\theta} = 3\cos\theta$

32. $u = 2\cos\theta \quad \frac{1}{\sqrt{4-u^2}} = \frac{1}{\sqrt{4-(2\cos\theta)^2}} = \frac{1}{2\sqrt{1-\cos^2\theta}} = \frac{1}{2\sin\theta} = \frac{1}{2}\csc\theta$

34. $\frac{1}{(x^2+5)^2} = \left(\frac{1}{(\sqrt{5}\tan\theta)^2+5}\right)^2 = \frac{1}{(5\tan^2\theta+5)^2} = \frac{1}{(5(\tan^2\theta+1))^2}$
 $= \frac{1}{(5\sec^2\theta)^2} = \frac{(\cos^2\theta)^2}{25} = \frac{\cos^4\theta}{25}$

38 a) $\sin t = .35 \Rightarrow \sin(-t) = -.35$ b) $\sin\phi = .47 \Rightarrow \sin(-\phi) = -.47$
 c) $\cos\alpha = .21 \Rightarrow \cos(-\alpha) = .21$ d) $\cos\beta = -.56 \Rightarrow \cos(-\beta) = -.56$

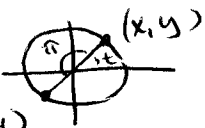
42. $\cos(t+2\pi k) = \cos t \quad \sin(t+2\pi k) = \sin t$

a) $\sin\left(\frac{17\pi}{4}\right) = \sin\left(\frac{\pi}{4}\right) = \frac{1}{\sqrt{2}}$ b) $\sin\left(-\frac{17\pi}{4}\right) = \sin\left(-\frac{\pi}{4}\right) = -\frac{1}{\sqrt{2}}$

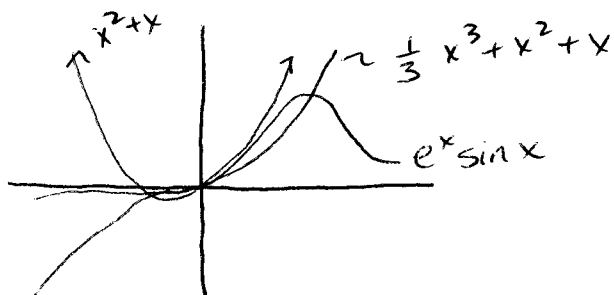
c) $\cos(11\pi) = \cos(\pi) = -1$ d) $\cos\left(\frac{53\pi}{4}\right) = \cos\left(\frac{5\pi}{4}\right) = -\frac{1}{\sqrt{2}}$

e) $\tan\left(-\frac{7\pi}{4}\right) = \tan\left(\frac{\pi}{4}\right) = 1$ f) $\cos\left(\frac{7\pi}{4}\right) = \frac{1}{\sqrt{2}}$ g) $\sec\left(\frac{11\pi}{6}+2\pi\right) = \frac{2}{\sqrt{3}}$

h) $\csc\left(2\pi - \frac{\pi}{3}\right) = -\frac{2}{\sqrt{3}}$

57.  i) $\sin(t+\pi) = -\sin t$ $y = \sin t$ so $-\sin t = -y$
 ii) $\sin(t-\pi) = -\sin t$ $\sin(t+\pi) = -y$
 iii) $\cos(t+\pi) = -\cos t$ $\cos t = x$ so $-\cos t = -x$
 iv) $\cos(t-\pi) = -\cos t$ $\cos(t+\pi) = -x$

68. x	x^2+x	$\frac{1}{3}x^3+x^2+x$	$e^x \sin x$	As you can see
0.1	.11	.110333	.11033299	
0.2	.24	.2426667	.24265527	
0.3	.39	.399	.3989	
0.4	.56	.581333	.5809439	
0.5	.75	.7916667	.7904	$\frac{1}{3}x^3+x^2+x \approx e^x \sin x$ for x values given



from 0-1.3 the 3 curves are very close
 until 2.3 all are increasing (for positive x)

$-\pi \leq x \leq \pi$
 $-10 \leq y \leq 10$