CCSD CLARK COUNTY SCHOOL DISTRICT

#	Question Type	Unit	Common Core State Standard(s)	DOK Level	Key
1	MC	8	F.TF.C.8, F.TF.C.9	1	B
2	MC	8	F.TF.C.8, F.TF.C.9	1	C
3	MC	8	F.TF.C.8, F.TF.C.9	2	B
4	MC	8	F.TF.C.8, F.TF.C.9	2	C
5	MC	8	F.TF.C.8, F.TF.C.9	3	A
6	MC	8	F.TF.C.8, F.TF.C.9	3	D
7	FR	8	F.TF.C.8, F.TF.C.9	1	-
8	FR	8	F.TF.C.8, F.TF.C.9	1	-
9	FR	8	F.TF.C.8, F.TF.C.9	3	-
10	FR	8	F.TF.C.9	1	-
11	FR	8	F.TF.C.9	2	-
12	FR	8	F.TF.C.9	1	-
13	MC	8	F.TF.B.7	3	D
14	MC	8	F.TF.B.7	3	A
15	FR	8	F.TF.B.7	2	-
16	FR	8	F.TF.B.7	2	-
17	FR	8	F.TF.B.7	1	-

7. (8.11) Verify that the following equation is an identity.

$$\frac{\cos x}{1-\sin x}=\frac{1+\sin x}{\cos x}$$

Work on the right side.

$$\frac{1+\sin x}{\cos x}=\frac{(1+\sin x)(1-\sin x)}{\cos x(1-\sin x)}$$ Multiply by 1 in the form $\frac{1-\sin x}{1-\sin x}$.

$$=\frac{1-\sin^2 x}{\cos x(1-\sin x)}$$ $(x+y)(x-y)=x^2-y^2$

$$=\frac{\cos^2 x}{\cos x(1-\sin x)}$$ $1-\sin^2 x=\cos^2 x$

$$=\frac{\cos x}{1-\sin x}$$ Lowest terms

8. (8.11) Use fundamental identities to simplify the expression.

$$\frac{\sin\beta\tan\beta}{\cos\beta}$$

$$\frac{\sin\beta\tan\beta}{\cos\beta}$$
$$\frac{\sin\beta}{\cos\beta}\cdot\frac{\tan\beta}{1}$$
$$\tan\beta\cdot\tan\beta$$
$$\tan^2\beta$$

9. (8.11) Verify that the trigonometric equation is an identity.

$$\sin^4\theta-\cos^4\theta=2\sin^2\theta-1$$

$\sin^4\theta-\cos^4\theta=2\sin^2\theta-1$ — original equation

$\left(\sin^2\theta+\cos^2\theta\right)\left(\sin^2\theta-\cos^2\theta\right)=2\sin^2\theta-1$ — work the left side, factor into difference of squares

$1\left(\sin^2\theta-\cos^2\theta\right)=2\sin^2\theta-1$ — substitute, $\sin^2\theta+\cos^2\theta=1$

$\left(\sin^2\theta-\left(1-\sin^2\theta\right)\right)=2\sin^2\theta-1$ — substitute, $\cos^2\theta=1-\sin^2\theta$

$2\sin^2\theta-1=2\sin^2\theta-1$

10. (8.12) Find the exact value of $\sin 75°$.

$$\sin 75° = \sin\left(45°+30°\right)$$
$$\sin 75° = \sin 45°\cos 30° + \cos 45°\sin 30°$$
$$\sin 75° = \frac{\sqrt{2}}{2}\cdot\frac{\sqrt{3}}{2}+\frac{\sqrt{2}}{2}\cdot\frac{1}{2}$$
$$\sin 75° = \frac{\sqrt{6}+\sqrt{2}}{4}$$

11. (8.12) Find the exact value of $\tan\frac{7\pi}{12}$.

$\tan\frac{7\pi}{12} = \tan\left(\frac{\pi}{3}+\frac{\pi}{4}\right)$ rewrite $\frac{7\pi}{12}$

$\tan\frac{7\pi}{12} = \frac{\tan\frac{\pi}{3}+\tan\frac{\pi}{4}}{1-\tan\frac{\pi}{3}\tan\frac{\pi}{4}}$ apply the tangent sum identity

$\tan\frac{7\pi}{12} = \frac{\sqrt{3}+1}{1-\sqrt{3}\cdot 1}$

$\tan\frac{7\pi}{12} = \frac{\sqrt{3}+1}{1-\sqrt{3}}\cdot\frac{1+\sqrt{3}}{1+\sqrt{3}}$ rationalize the denominator

$\tan\frac{7\pi}{12} = \frac{\sqrt{3}+3+1+\sqrt{3}}{1-3}$ multiply

$\tan\frac{7\pi}{12} = \frac{4+2\sqrt{3}}{-2}$ combine terms

$\tan\frac{7\pi}{12} = \frac{2\left(2+\sqrt{3}\right)}{-2}$ factor out 2 in the numerator

$\tan\frac{7\pi}{12} = -2-\sqrt{3}$ lowest terms

12. (8.13) Find the exact value of $\cos 15°$ using half-angle identity for cosine.

Solution

$$\cos 15° = \cos\frac{1}{2}(30°) = \sqrt{\frac{1+\cos 30°}{2}}$$

Choose the positive square root.

$$= \sqrt{\frac{1+\frac{\sqrt{3}}{2}}{2}} = \sqrt{\frac{\left(1+\frac{\sqrt{3}}{2}\right)\cdot 2}{2\cdot 2}} = \frac{\sqrt{2+\sqrt{3}}}{2}$$

Simplify the radicals.

15. Solve on the interval $[0, 2\pi)$.

$\sin x \tan x = \sin x$

$\sin x \tan x = \sin x$	
$\sin x \tan x - \sin x = 0$	subtract $\sin x$ from both sides of equation
$\sin x(\tan x - 1) = 0$	factor out $\sin x$
$\sin x = 0$ or $\tan x - 1 = 0$	zero product property
$\tan x = 1$	
$x = 0$ or $x = \pi$ $\quad x = \frac{\pi}{4}$ or $x = \frac{5\pi}{4}$	

16. Solve on the interval $[0, 2\pi)$.

$\cos^4 x + \cos^2 x - 2 = 0$

$\cos^4 x + \cos^2 x - 2 = 0$	original equation
$(\cos^2 x + 2)(\cos^2 x - 1) = 0$	factor
$\cos^2 x + 2 = 0$ or $\cos^2 x - 1 = 0$	zero product property
$\cos^2 x = -2$ $\quad \cos^2 x = 1$	solve for $\cos^2 x$
$\cos x = \pm\sqrt{-2}$ $\quad \cos x = \pm\sqrt{1} = \pm 1$	take square root of each side
no real solution $\quad 0, \pi$	

17. Solve on the interval $\left[0, 2\pi\right)$.

$$2\cos^2 x - \sin x - 1 = 0$$

$2\cos^2 x - \sin x - 1 = 0$	original equation
$2\left(1 - \sin^2 x\right) - \sin x - 1 = 0$	substitute $\cos^2 x = 1 - \sin^2 x$(Pythagorean Identity)
$2 - 2\sin^2 x - \sin x - 1 = 0$	multiply
$-2\sin^2 x - \sin x + 1 = 0$	combine like terms
$-1\left(2\sin^2 x + \sin x - 1\right) = 0$	factor out -1
$-1(2\sin x - 1)(\sin x + 1) = 0$	factor
$2\sin x - 1 = 0$ or $\sin x + 1 = 0$	zero product property
$\sin x = \frac{1}{2}$ $\quad \sin x = -1$	solve for $\sin x$
$x = \frac{\pi}{6}$ or $\frac{5\pi}{6}$ $\quad x = \frac{3\pi}{2}$	