Adv. Alg./ Trig.
Worksheet - Sec. 7.1

Name_____
Date_____

Simplify :

1. sec x cos x

$= \frac{1}{\cos(x)} \cdot \frac{\cos(x)}{1}$

$= 1$

2. tan2 x - sec2 x

3. $\frac{1-\cos^2 x}{\sin x}$

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

$= \sin(x)$

4. cot x sec x

$= \frac{\cos(x)}{\sin(x)} \cdot \frac{1}{\cos(x)}$

$= \frac{1}{\sin(x)}$

$= \csc(x)$

5. cos2 x (sec2 x - 1)

6. $\frac{\sec^2 x - 1}{\sin^2 x}$

$= \frac{\tan^2(x)}{\sin^2(x)}$

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

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

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

7. cot x sec x

See # 4

8. $\frac{\cot x}{\tan x}$

$= \frac{\frac{\cos(x)}{\sin(x)}}{\frac{\sin(x)}{\cos(x)}}$

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

$= \cot^2(x)$

9. $\frac{\sin^2 x \cot x}{\cos x}$

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

$= \frac{\sin(x) \cdot \cos(x)}{\cos(x)}$

$= \sin(x)$

10. sin2 x cos2 x - cos2 x

11. cos x + sin x tan x

$= \cos(x) + \frac{\sin(x)}{1} \cdot \frac{\sin(x)}{\cos(x)}$

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

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

$= \frac{1}{\cos(x)}$

$= \sec(x)$

12. sin x (~~csc x~~ - sin x)

$= \sin(x)\left(\frac{1}{\sin(x)} - \frac{\sin(x)}{1}\right)$

$= 1 - \sin^2(x)$

$= \cos^2(x)$

Trig Identities 1

Verify each identity.

1. $\tan x \csc x = \sec x$

$\frac{\sin(x)}{\cos(x)} \cdot \frac{1}{\sin(x)}$

$\frac{1}{\cos(x)} =$

$\sec(x) =$ ✓

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

$= 1 - (1 - \cos^2(\theta))$

$= 1 - 1 + \cos^2(\theta)$

$= \cos^2(\theta)$ ✓

3. $\frac{\sin^2\theta + \cos^2\theta}{\sin^2\theta} = \csc^2\theta$

$\frac{1}{\sin^2(\theta)} =$

$\csc^2(\theta) =$ ✓

4. $\sin^2 x \cot^2 x = (1 - \sin x)(1 + \sin x)$

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

$\cos^2(x) =$

$1 - \sin^2(x) =$

$(1 - \sin(x))(1 + \sin(x)) =$

5. $\frac{1}{\sec^2 x} + \frac{1}{\csc^2 x} - 1 = 0$

$\cos^2(x) + \sin^2(x) - 1 =$

$1 - 1 =$

$0 =$ ✓

6. $\frac{\tan\theta \cos\theta}{\sin\theta} = 1$

$\frac{\frac{\sin\theta}{\cos\theta} \cdot \cos(\theta)}{\sin(\theta)} =$

$\frac{\sin(\theta)}{\sin(\theta)} =$

$1 =$ ✓

7. $\sin\theta\,(1 + \cot^2\theta) = \csc\theta$

$\sin\theta \cdot \csc^2\theta =$

$\sin\theta \cdot \frac{1}{\sin^2(\theta)} =$

$\frac{1}{\sin^2(\theta)} =$

$\csc(\theta) =$ ✓

8. ~~$1 + \cos 2x = \frac{2}{1 + \tan^2 x}$~~

9. $\csc^2 x \tan^2 x = 1 + \tan^2 x$

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

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

$\sec^2(x) =$

$1 + \tan^2(x) =$ ✓

10. $(\csc x - \cot x)^2 = \frac{1 - \cos x}{1 + \cos x}$

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

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

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

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

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

(1) $\tan(x) \cdot \frac{1}{\cot(x)} = \tan^2(x)$

$\tan(x) \cdot \tan(x) =$

$\tan^2(x) =$ ✓

(2) $(1 - \cos(\alpha))(1 + \cos(\beta)) = \sin^2\beta$

$1 - \cos^2(\beta) =$

$\sin^2(\beta) =$ ✓

(3) $\cos^2(x)\csc(x)\sec(x) = \cot(x)$

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

$\frac{\cos(x)}{\sin(x)} =$

$\cot(x) =$ ✓

(4) $(1 - \cos^2(\alpha))(\cot(\alpha)) = \sin(\alpha)\cos(\alpha)$

$\sin^2(x) \cdot \frac{\cos(\alpha)}{\sin(\alpha)} =$

$\sin(x)\cos(x) =$ ✓

(5) $\frac{\sin(x)}{\cos(x)} + \frac{\cos(x)}{\sin(x)} = \frac{\csc(x)}{\cos(x)}$

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

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

$\frac{1}{\cos(x)} \cdot \frac{1}{\sin(x)} =$

$\frac{1}{\cos(x)} \cdot \csc(x) =$

$\frac{\csc(x)}{\cos(x)} =$ ✓

(6) $\tan(\theta)\csc(\theta)\cos(\theta) = 1$

$\frac{\sin(\theta)}{\cos(\theta)} \cdot \frac{1}{\sin(\theta)} \cdot \cos(\theta) =$

$1 = \checkmark$

(7) $(\sin(x) - \cos(x))^2 = 1 - 2\sin(x)\cos(x)$

$\sin^2(x) - 2\sin(x)\cos(x) - \cos^2(x) =$

$1 - 2\sin(x)\cos(x) = \checkmark$

(8) $\frac{\csc(x)}{\cos(x)} - \frac{\cos(x)}{\sin(x)} = \tan(x)$

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

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

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

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

$\frac{\sin(x)}{\cos(x)} =$

$\tan(x) = \checkmark$

(9) $\csc(x) - \sin(x) = \cot(x)\cos(x)$

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

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

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

$\frac{\cos(x)\cos(x)}{\sin(x)} =$

$\cot(x)\cos(x) = \checkmark$

(10) $\cot(x)\left(\tan(x)\sin(x)+\cos(x)\right)=\sec(x)$

$$\frac{\cos(x)}{\sin(x)}\left(\frac{\sin^2(x)}{\cos(x)}+\cos(x)\right)=$$

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

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

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

$$\frac{1}{\sin(x)}=$$

$\csc(x)=$ ✓

(11) $\left(1+\sin(x)\right)\left(1-\sin(x)\right)=\cos^2(x)$

$1-\sin^2(x)=$

$\cos^2(x)=$ ✓

(12) $\left(\csc(x)-\sin(x)\right)=\cos(x)\cot(x)$

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

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

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

$\cos(x)\cot(x)=$ ✓

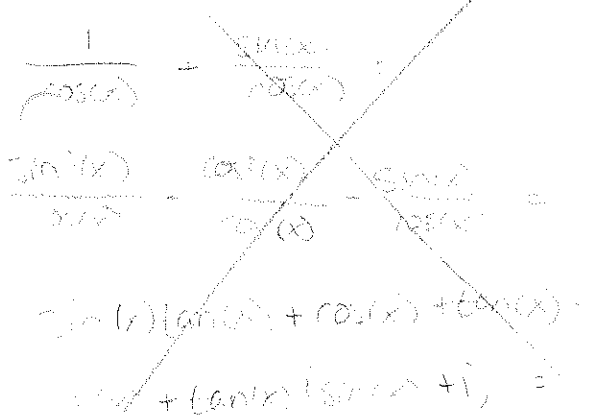
(13) $\dfrac{\sin(x)}{\csc(x)}+\dfrac{\cos(x)}{\sec(x)}=1$

$$\frac{\frac{\sin(x)}{1}}{\frac{1}{\csc(x)}}+\frac{\frac{\cos(x)}{1}}{\frac{1}{\sec(x)}}=$$

$\sin^2(x)+\cos^2(x)=$

$1=$ ✓

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



Incorrect. Check last verification page.

(15) $\frac{\csc^2(x)}{\cot^2(x)} - 1 + \tan(x)$

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

$\frac{\sin^2(x)}{\cos^2(x)\sin^4(x)} =$

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

$\sec^2(x) =$

$1+\tan^2(x) =$ ✓

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

$\frac{\tan^2(x)}{\sin^2(x)} =$

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

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

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

$\sec^2(x) = \checkmark$

(17) $\tan^2(x) - \sin^2(x) = \sin^2(x)\tan^2(x)$

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

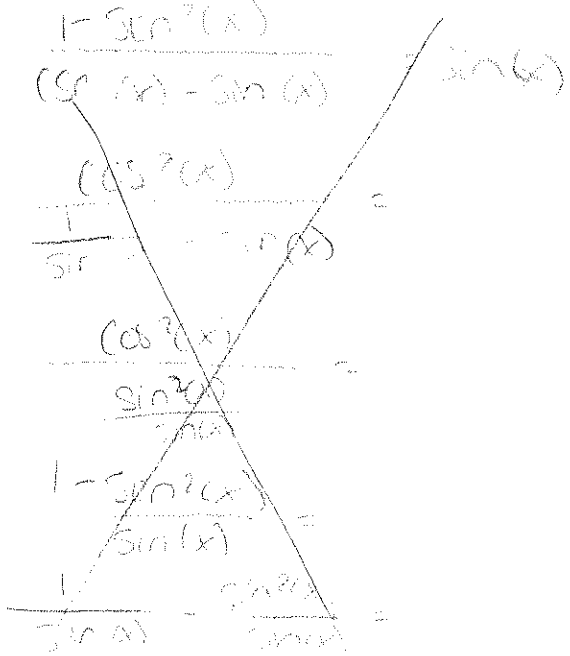
$\frac{\sin^2(x) - \sin^2(x)\cos^2(x)}{\cos^2(x)} =$

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

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

$\sin^2(x)\tan^2(x) = \checkmark$

(18) $\frac{1-\sin^2(x)}{(\sec(x)-\sin(x))}$



Incorrect. Check last verification page.

(19) $\frac{\sec(x)-\cos(x)}{\cos(x)} = \tan^2(x)$

$\frac{\frac{1}{\sec(x)}-\cos(x)}{\cos(x)} =$

$\frac{\frac{\cos^2(x)}{\sec(x)}}{\cos(x)} =$

$\frac{\cos^2(x)}{\sec(x)} \cdot$

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

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

$\tan^2(x) =$ ✓

(20) $\sin(x)(\csc(x)-\sin(x)) = \cos^2(x)$

$\sin(x)\left(\frac{1}{\sin(x)}-\sin(x)\right) =$

$1-\sin^2(x) =$

$\cos^2(x) =$ ✓

(14)

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

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

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

$$\frac{\cos x(1+\sin x)}{(1+\sin x)(1-\sin x)}$$

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

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

$$\frac{1-\sin^2 x}{\frac{1}{\sin x} - \frac{\sin^2 x}{\sin x}}$$

$$\frac{1-\sin^2 x}{\frac{1-\sin^2 x}{\sin x}}$$

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

A 3-1

Name Key Date

WORKSHEET - THE BASIC 8 TRIG IDENTITIES

Simplify each expression to a single trig function or number.

1. $\sec\theta \sin\theta$

$= \frac{1}{\cos(\theta)} \cdot \frac{\sin(\theta)}{1}$

$= \frac{\sin(\theta)}{\cos(\theta)}$

$= \tan(\theta)$

2. $\cos\theta \tan\theta$

$= \cos(\theta) \cdot \frac{\sin(\theta)}{\cos(\theta)}$

$= \sin(\theta)$

3. $\tan^2\theta - \sec^2\theta$

$= \tan^2(\theta) - (1 + \tan^2(\theta))$

$= \tan^2(\theta) - 1 - \tan^2(\theta)$

$= -1$

4. $1 - \cos^2\theta$

$= \sin^2(\theta)$

5. $(1-\cos\theta)(1+\cos\theta)$

$= 1 - \cos^2(\theta)$

$= \sin^2(\theta)$

6. $(\sec x - 1)(\sec x + 1)$

$= \sec^2(\theta) - 1$

$= \tan^2(\theta)$

7. $\frac{1}{\sin^2 A} - \frac{1}{\tan^2 A}$

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

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

$= \frac{\sin^2(A)}{\sin^2(A)}$

$= 1$

8. $1 - \frac{\sin^2\theta}{\tan^2\theta}$

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

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

$= 1 - \cos^2(\theta)$

$= \sin^2(\theta)$

A 3-1

9. $\frac{1}{\cos^2\theta} - \frac{1}{\cot^2\theta}$

$= \frac{1}{\cos^2(\theta)} - \tan^2(\theta)$

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

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

$= \frac{\cos^2(\theta)}{\cos^2(\theta)}$

1

10. $\cos\theta(\sec\theta - \cos\theta)$

$= \cos(\theta)\left(\frac{1}{\cos(\theta)} - \frac{\cos(\theta)}{1}\right)$

$= 1 - \cos^2(\theta)$

$= \sin^2(\theta)$

11. $\cos^2 A(\sec^2 A - 1)$

$= \cos^2(\theta) \cdot \tan^2(\theta)$

$= \cos^2(\theta) \cdot \frac{\sin^2(\theta)}{\cos^2(\theta)}$

$= \sin^2(\theta)$

12. $(1-\cos x)(1+\sec x)(\cos x)$

$= (1-\cos(x))\left(1+\frac{1}{\cos(x)}\right)\cos(x)$

$= (1-\cos(x))(\cos(x)+1)$

$= \cos^2(x) + 1 - \cos^2(x) - \cos(x) + \cos(x) - 1$

$= 1 - \cos^2(x)$

$= \sin^2(x)$

13. $\frac{\sin x \cos x}{1-\cos^2 x}$

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

$= \frac{\cos(x)}{\sin(x)}$

$= \cot(x)$

14. $\frac{\tan^2\theta}{\sec\theta + 1} + 1$

$= \frac{\sec^2(\theta) - 1}{\sec(\theta)+1} + 1$

$= \frac{(\sec(\theta)-1)(\sec(\theta)+1)}{\sec(\theta)+1} + 1$

$= \sec(\theta) - 1 + 1$

$= \sec(\theta)$

Precalculus Trig Equations I

Solve each equation for principal values of x.

1. $2\sin^2 x + \sin x = 0$

$\sin(x)(2\sin(x)+1) = 0$

$\sin(x) = 0$ $\quad$ $\sin(x) = -\frac{1}{2}$

$0°, 180°$ $\quad$ $210°, 330°$

2. $4\sin^2 x - 3 = 0$

$\sin^2(x) = \frac{3}{4}$

$\sin(x) = \frac{\sqrt{3}}{2}, -\frac{\sqrt{3}}{2}$

$60°, 120°$ $\quad$ $240°, 300°$

3. $2\cos^2 x = \sin x + 1$

$2(1-\sin^2(x)) - \sin(x) - 1 = 0$

$2 - 2\sin^2(x) - \sin(x) - 1 = 0$

$-2\sin^2(x) - \sin(x) + 1 = 0$

$2\sin^2(x) + \sin(x) - 1 = 0$

$(2\sin(x)-1)(\sin(x)+1) = 0$

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

$30°, 150°$ $\quad$ $270°$

4. $\sin^2 x - 3\sin x + 2 = 0$

$(\sin(x)-2)(\sin(x)-1) = 0$

$\sin(x) = 2$ $\quad$ $\sin(x) = 1$

DNE $\quad$ $90°$

~~5.~~ $\sin 2x = \cos x$

6. $\tan x + \cot x = 2$

$\tan(x) + \frac{1}{\tan(x)} = 2$

$\frac{\tan^2(x)+1}{\tan(x)} = 2$

$\tan^2(x) + 1 = 2\tan(x)$

$\tan^2(x) - 2\tan(x) + 1 = 0$

$(\tan(x)-1)(\tan(x)-1) = 0$ $\quad$ $\tan(x) = 1$

$45°, 225°$

7. $\sin^2 x - \sin x = 0$

$\sin(x)(\sin(x)-1) = 0$

$\sin(x) = 0$ $\quad$ $\sin(x) = 1$

$0°, 180°$ $\quad$ $90°$

8. $\sin^2 x - 2\sin x - 3 = 0$

$(\sin(x)+1)(\sin(x)-3) = 0$

$\sin(x) = -1$ $\quad$ $\sin(x) = 3$

$270°$ $\quad$ DNE

9. $\sin^2 x = \cos x - 1$

$1 - \cos^2(x) = \cos(x) - 1$

$0 = \cos^2(x) + \cos(x) - 2$

$0 = (\cos(x)+2)(\cos(x)-1)$

$\cos(x) + 2 = 0$ $\quad$ $\cos(x) = 1$

DNE $\quad$ $x = 0°$

~~10.~~ $\sin 2x \sin x + \cos 2x \cos x = 1$

Precalculus Trig Equations 2

Solve each equation for ~~principal values of x~~ $[0, 360)$

X $\sin 2x = 2\cos x$

2. $\cos x \tan x - \sin^2 x = 0$

$\sin(x) - \sin^2(x) = 0$

$\sin(x)(1 - \sin(x)) = 0$

$\sin(x) = 0$ | $1 - \sin(x) = 0$

$0°, 180°$ | $\sin(x) = 1$, $= 90°$

3. ~~$\sin^2 x - 2\sin x + 1 = 0$~~

~~$(\sin(x) - 1)(\sin(x) - 1) = 0$~~

$\sin(x) - 1 = 0$

$\sin(x) = 1$

$90°$

X $3\cos 2x - 5\cos x = 1$

5. $3\tan^2 x + 4\sec x + 4 = 0$

See homework

X $4\tan x + \sin 2x = 0$

X $\cos 2x + 3\cos x - 1 = 0$

X $\cos 2x + \sin x = 1$

9. $3\sin^2 x - \cos^2 x = 0$

$3\sin^2(x) - (1 - \sin^2(x)) = 0$

$3\sin^2(x) - 1 + \sin^2(x) = 0$

$4\sin^2(x) = 1$

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

$30°, 150°$ $210°, 330°$

10. $\sqrt{2}\cos x - 1 = 0$

$\cos(x) = \frac{1}{\sqrt{2}}$

$\cos(x) = \frac{\sqrt{2}}{2}$

$45°, 315°$

Precalculus Trig Equations 3

$[0, 360)$

Solve each equation ~~for principal values of x.~~

1. $4\sin^2 x - 3 = 0$

$\sin(x) = \frac{\sqrt{3}}{2}, -\frac{\sqrt{3}}{2}$

$60°, 120°$ $\quad 240°, 300°$

2. $3\tan^2 x - 1 = 0$

$\tan(x) = \pm\frac{1}{\sqrt{3}}$

$\tan(x) = \frac{\sqrt{3}}{3}, -\frac{\sqrt{3}}{3}$

$30°, 210°$ $\quad 150°, 330°$

3. $\sin x - \sin x \cos x = 0$

$\sin(x)(1 - \cos(x)) = 0$

$\sin(x) = 0$	$1 - \cos(x) = 0$
$0°, 180°$	$\cos(x) = 1$
	$0°$

$\cos^2 x = 3\sin x + 3$

$(-\sin^2(x)) = 3\sin(x) + 3$

$0 = \sin^2(x) + 3\sin(x) + 2$

$(\sin(x) + 2)(\sin(x) + 1) = 0$

$\sin(x) = -2$	$\sin(x) = -1$
DNE	$270°$

4. $\cos^2 x \sin x - \cos^2 x = 0$

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

$\cos^2(x) = 0$	$\sin(x) - 1 = 0$
$90°, 270°$	$\sin(x) = 1$
	$90°$

6. $3\tan^2 x + 4\sec x + 4 = 0$

$3\sec^2(x) - 3 + 4\sec(x) + 4 = 0$

$3\sec^2(x) + 4\sec(x) + 1 = 0$

$3\sec^2(x) + 3\sec(x) + \sec(x) + 1 = 0$

$3\sec(x)(\sec(x) + 1) + 1(\sec(x) + 1) = 0$

$(3\sec(x) + 1)(\sec(x) + 1) = 0$

7. $\sin^2 x = \cos x - 1$

$1 - \cos^2(x) = \cos(x) - 1$

$0 = \cos^2(x) + \cos(x) - 2$

$(\cos(x) + 2)(\cos(x) - 1) = 0$

$\cos(x) = -2$	$\cos(x) = 1$
	$0°$

~~8.~~ $\cos 2x + \sin x = 1$

~~8.~~ $\cos 2x + 3\cos x - 1 = 0$

10. $\cos^2 x - \frac{7}{2}\cos x - 2 = 0$

$(\cos(x) + \frac{1}{2})(\cos(x) - 4) = 0$

$\cos(x) = -\frac{1}{2}$	$\cos(x) = 4$
$120°, 240°$	DNE

11. $3\sin^2 x - \cos^2 x = 0$

$3\sin^2 x$

See classwork

~~12.~~ $3\cos 2x - 5\cos x = 1$

6-8 Trig Equations (II) p. 518: 1-19 odd, 25

I. Solving Trig Equations
- A) Set trig function equal to a numerical value
- B) Apply trig identities to rename expression in terms of one trig function
- C) Factor:
  1. GCF
  2. Product of binomials
- D) Divide $\cos\theta$ to produce $\tan\theta$

Solve for $0 \le \theta < 2\pi$.

1. $\cos^2\theta - \cos\theta = 0$

$\cos(\theta)\left(\cos(\theta)-1\right)=0$

$\cos(\theta)=0$ | $\cos(\theta)-1=0$

$90°, 270°$ | $\cos(\theta)=1$

$0°$

2. $2\sin^2\theta - 3\sin\theta + 1 = 0$

$2\sin^2(x)-2\sin(x)-\sin(x)+1=0$

$2\sin(x)\left(\sin(x)-1\right)-1\left(\sin(x)-1\right)=0$

$\left(2\sin(x)-1\right)\left(\sin(x)-1\right)=0$

$\sin(x)=\frac{1}{2}$ | $\sin(x)-1=0$

$30°, 150°$ | $\sin(x)=1$

$90°$

3. $(\cot\theta - 1)(\csc\theta + 1) = 0$

$\cot(\theta)-1=0$ | $\csc(\theta)+1=0$

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

$1=\tan(x)$ | $-1=\sin(x)$

$45°, 225°$ | $270°$

4. $2\cos^2\theta = \sin\theta + 1$

$2\left(1-\sin^2(x)\right)=\sin(x)+1$

$2-2\sin^2(x)=\sin(x)+1$

$0=2\sin^2(x)+\sin(x)-1$

$0=2\sin^2(x)+2\sin(x)-\sin(x)-1$

$0=2\sin(x)\left(\sin(x)+1\right)-1\left(\sin(x)+1\right)$

$0=\left(2\sin(x)-1\right)\left(\sin(x)+1\right)$

$\sin(x)=1$ | $\sin(x)=\frac{1}{2}$

$90°$ | $30°, 150°$

5. $\sqrt{3}\sin\theta = \cos\theta$

$\tan(x)=\frac{\sqrt{3}}{3}$

$30°, 210°$

✗ 6. $\sin 2\theta + \sin\theta = 0$

✗ 7. $\cos 2\theta = 1 - \sin\theta$

8. $\sin\theta\tan\theta = \sqrt{3}\sin\theta$

$\sin(\theta)\tan(\theta)-\sqrt{3}\sin(\theta)=0$

$\sin(\theta)\left(\tan(\theta)-\sqrt{3}\right)=0$

$\sin(\theta)=0$ | $\tan(\theta)-\sqrt{3}=0$

$\theta = 0°, 180°$ | $\tan(\theta)=\sqrt{3}$

$\theta = 60°, 240°$