$\frac{\sin^2 x}{\cos^2 x} + \frac{\cos^2 x}{\cos^2 x} = \frac{1}{\cos^2 x}$ $\sin^2 x + \cos^2 x = 1$ $\frac{\sin^2 x}{\sin^2 x} + \frac{\cos^2 x}{\sin^2 x} = \frac{1}{\sin^2 x}$ $1 + \cot^2 x = \csc^2 x$

Int 3MA C12 DDAY Name ______________________ Per _____ Group _____

1. Simplify these fundamental identities

a. $\sin^2 x - 1 =$ $-\cos^2 x$	b. $1 + \tan^2 x =$ $\sec^2 x$	c. $\frac{1}{\csc\theta} =$ $\sin\theta$	d. $\cos(-x) =$ $\cos x$
e. $\csc^2 x - 1 =$ $\cot^2 x$	f. $\frac{\cos x}{\sin x} =$ $\cot x$	g. $1 - \cos^2 x =$ $\sin^2 x$	h. $\csc^2 x - \cot^2 x =$ 1

2. Solve $4\sin x\cos x = -1$ for the interval $[0, 2\pi)$

Hint: What is sin(2x) ?

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

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

$2x = \frac{7\pi}{6} + 2\pi n$

$x = \frac{7\pi}{12} + \pi n$

$2x = \frac{11\pi}{6} + 2\pi n$

$x = \frac{11\pi}{12} + \pi n$

$\boxed{\frac{7\pi}{12}, \frac{19\pi}{12}, \frac{11\pi}{12}, \frac{23\pi}{12}}$

3. Solve $\cos x + 2 = 2\sin^2 x$ for all x

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

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

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

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

$\cos x = 0$ $2\cos x + 1 = 0$

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

$\frac{\pi}{2}$ $\frac{3\pi}{2}$ $\boxed{\frac{\pi}{2} + \pi n}$

$\boxed{\frac{2\pi}{3} + 2\pi n, \frac{5\pi}{3} + 2\pi n}$

3. Find all solutions in the interval $[0, 2\pi)$:

$\cos^2 x + 2\cos x - 3 = 0$

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

$\cancel{\cos x = -3}$ $\cos x = 1$

	$\cos x$	-1
$+3$	$3\cos x$	-3
$\cos x$	$\cos^2 x$	$-1\cos x$

-3 $\cos^2 x$ $3\cos x$ $-1\cos x$ $2\cos x$

0

4. Find all solutions in the interval $[0, 2\pi)$:

$\sin 2x = \sin x$

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

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

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

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

$\cos x = \frac{1}{2}$

π 0 $\frac{\pi}{3}$ $\frac{5\pi}{3}$

5. Find the exact value $\cos^{-1}(0)$

$\boxed{\frac{\pi}{2}}$

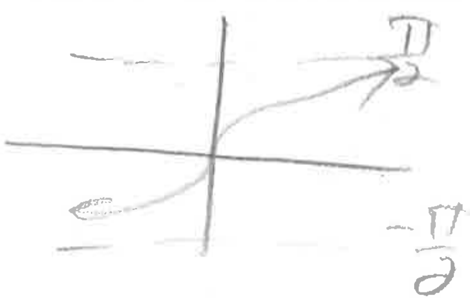
6. Find the exact value $\sin^{-1}\left(\cos\left(\frac{7\pi}{6}\right)\right)$

$\sin^{-1}\left(\frac{-\sqrt{3}}{2}\right)$

$\boxed{\frac{-\pi}{3}}$

$-\frac{\sqrt{3}}{2}$ 30

7. Sketch $y = \tan^{-1} x$ and show domain & range.



main: Range:

8. Find $\cos 2A$ if $\sin A = \frac{5}{13}$ and A is in the second quadrant.

$\cos 2A = \cos^2 A - \sin^2 A$

$= \left(\frac{-12}{13}\right)^2 - \left(\frac{5}{13}\right)^2$

$\frac{144}{169} - \frac{25}{169}$

$\boxed{\frac{119}{169}}$

13 5 -12

$5^2 + x^2 = 13^2$

$\sqrt{x^2} = \sqrt{144}$

9. Verify $\dfrac{\tan x+\cot y}{\tan x\cot y}=\tan y+\cot x$

$\dfrac{\tan x}{\tan x\cot y}+\dfrac{\cot y}{\tan x\cot y}$

$\dfrac{1}{\cot y}+\dfrac{1}{\tan x}$

$\tan y+\cot x$

10. Verify $\dfrac{1}{1-\cos x}+\dfrac{1}{1+\cos x}=2\csc^2 x$

$\dfrac{1+\cos x}{1+\cos x}\cdot\dfrac{1}{1-\cos x}+\dfrac{1}{1+\cos x}\cdot\dfrac{1-\cos x}{1-\cos x}$

$\dfrac{1+\cos x+1-\cos x}{1-\cos^2 x}$

$\dfrac{2}{\sin^2 x}=$

$2\csc^2 x$

11. Write the equation of the parabola $y=ax^2+bx+c$ passing through points $(0,-7)$, $(-1,-8)$ *and* $(2,13)$.

$-7=a(0)^2+b(0)+c$

$-7=c$

$-8=a-b-7$

$-1=a-b$

$10=2a+b$

$9=3a$

$3=a$

$13=4a+2b-7$

$20=4a+2b$

$10=2a+b$

$10=2(3)+b$

$10=6+b$

$4=b$

$y=3x^2+4x-7$

12. Solve $\begin{cases} x=2-y-z \\ 2x+z=7 \\ x-y+3z=-4 \end{cases}$

$5=2-y+3$

$0=-y$

$0=y$

(A) $x+y+z=2$

$2x+z=7$

(B) $x-y+3z=-4$

(A+B) $2x+4z=-2$

$-2x-z=-7$

$3z=-9$

$z=3$

$2x+3=7$

$2x=10$

$x=5$

$(5,0,-3)$

14. Solve $15-2\left(7^{3x+4}\right)=8$

$-2(7^{3x+4})=-7$

$7^{3x+4}=3.5$

$\log_7 3.5=3x+4$

$.6437=3x+4$

$-1.1187=x$

15. Find the sum of the sequence: $64+16+4+\ldots$

$64\cdot r=16$

$r=\frac{1}{4}$ or $.25$

$S_\infty=\dfrac{64}{1-\frac{1}{4}}=\dfrac{64}{\frac{3}{4}}=\dfrac{256}{3}$ or 85.33

16. Solve $\dfrac{2x}{x+5}-\dfrac{1}{4}=x$

$\dfrac{(x+5)(4)}{1}\cdot\dfrac{2x}{x+5}-\dfrac{1}{4}\cdot\dfrac{(4)(x+5)}{1}=x(4)(x+5)$

$8x-(x+5)=4x(x+5)$

$8x-x-5=4x^2+20x$

$0=4x^2+13x+5$

$x=\dfrac{-13\pm\sqrt{13^2-4(4)(5)}}{2(4)}=\boxed{\dfrac{-13\pm\sqrt{89}}{8}}$

17. Find the value of the third term of the binomial expansion of $\left(\dfrac{3}{2x^2}-\dfrac{x^3}{y^4}\right)^8$

${}_8C_2\left(\dfrac{3}{2x^2}\right)^6\left(\dfrac{-x^3}{y^4}\right)^2$

$28\left(\dfrac{729}{64x^{12}}\right)\left(\dfrac{x^6}{y^8}\right)$

$\dfrac{5103}{16x^6y^8}$

18. Consider the expansion of $\left(2x^3+\dfrac{3}{x}\right)^8=256x^{24}+3072x^{20}+\ldots+kx^0+\ldots$ Find k.

${}_8C_6\left(2x^3\right)^2\left(\dfrac{3}{x}\right)^6$

$28\left(4x^6\right)\left(\dfrac{729}{x^6}\right)=81648$