Int 3MA C9 DDAY Name: KEY Per:___Group:___

No Calculator

1. Convert 150° to radian measure.

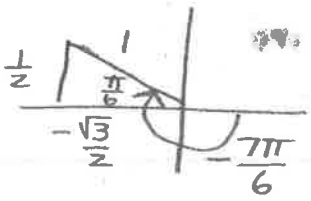
$150^\circ\left(\frac{\pi}{180^\circ}\right) \rightarrow \frac{150\pi}{180} \rightarrow \frac{15\pi}{18} \rightarrow \boxed{\frac{5}{6}\pi}$

2. Convert $\frac{4\pi}{3}$ to degree measure.

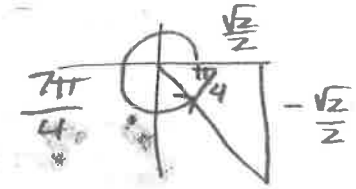
$\frac{4\pi}{3}\left(\frac{180^\circ}{\pi}\right) \rightarrow \boxed{240^\circ}$

3. Find the exact value of the following. Sketch the angle (in the correct quadrant) and label the special Δ.

a. $\sin\left(-\frac{7\pi}{6}\right) = \boxed{\frac{1}{2}}$

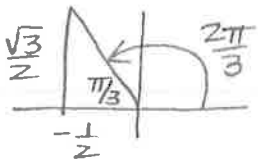


b. $\sec\frac{7\pi}{4} \rightarrow \frac{2}{\sqrt{2}}\left(\frac{\sqrt{2}}{\sqrt{2}}\right) \rightarrow \boxed{\sqrt{2}}$



c. $\cos\frac{80\pi}{3} \rightarrow \cos\frac{2\pi}{3}$

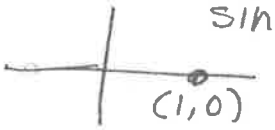
$-13\left(\frac{6\pi}{3}\right) \rightarrow \frac{78}{3}\pi$



$= \boxed{-\frac{1}{2}}$

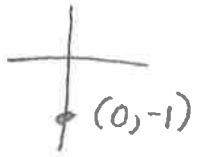
d. $\csc 10\pi$ $\frac{1}{0}$ $\boxed{\text{undefined}}$

$\sin 10\pi = 0$



e. $\cot\frac{19\pi}{2} \rightarrow \cot\frac{3\pi}{2}$

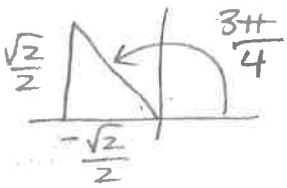
$-4\left(\frac{4\pi}{2}\right)$



$\frac{0}{-1} \rightarrow \boxed{0}$

f. $\csc\left(-\frac{21\pi}{4}\right) \rightarrow \csc\frac{3\pi}{4}$

$+3\left(\frac{8\pi}{4}\right)$



$\boxed{\sqrt{2}}$

4. Graph one cycle for each of the following and find the amplitude, vertical shift, period and phase shift.

a. $y = -3\csc 2(x+\frac{\pi}{3})+1$

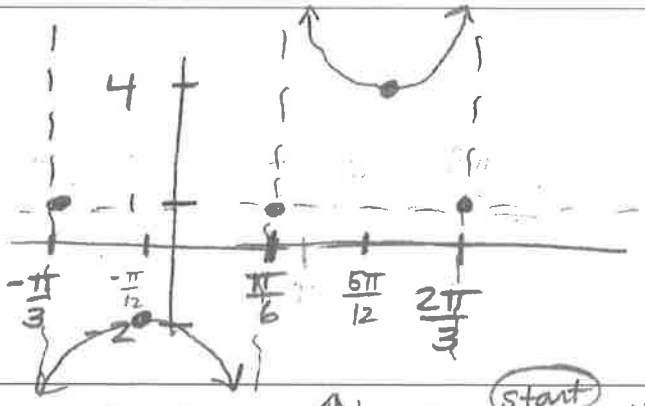
$y = -3\sin$

Amplitude: NONE

Vertical Shift: 1

Period: π

Phase Shift: $-\frac{\pi}{3}$



b. $y = 5\tan(2x+\frac{\pi}{4})-2$

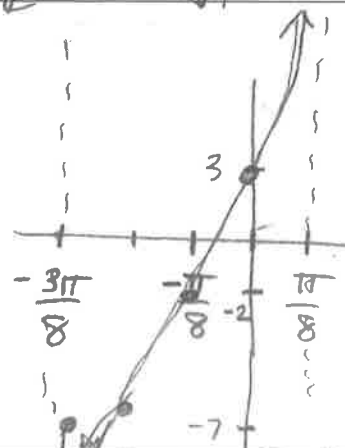
Amplitude: NONE

Vertical Shift: -2

Period: $\frac{\pi}{2}$

Phase Shift: $-\frac{\pi}{8}$

$2x+\frac{\pi}{4} = 0 \rightarrow 2x = -\frac{\pi}{4} \rightarrow x = -\pi/8$



start: $2x+\frac{\pi}{4} = -\frac{\pi}{2}$

$8x+\pi = -2\pi$

$8x = -3\pi$

$x = -\frac{3\pi}{8}$

Fraction Bust (x by 4)

end: $2x+\frac{\pi}{4} = \frac{\pi}{2}$

$8x+1\pi = 2\pi$

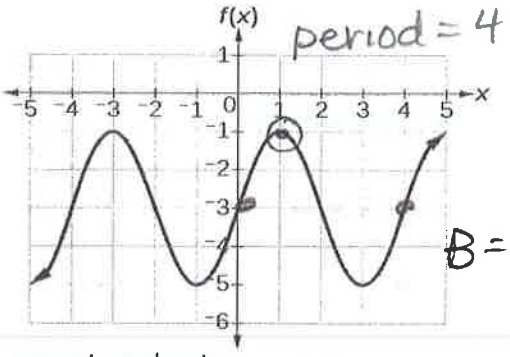
$8x = \pi$

$x = \pi/8$

5. Name the following trig function using sine and cosine.

Sine: $y = 2\sin\frac{\pi}{2}(x) - 3$

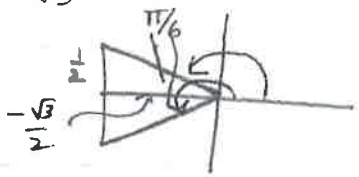
Cosine: $y = 2\cos\frac{\pi}{2}(x-1) - 3$



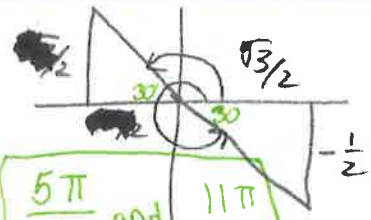
6. Solve for all possible values within $[0, 2\pi]$. Show labeled triangles in correct quadrants.

a. $\sec\theta = \left(-\frac{2\sqrt{3}}{3}\right)\frac{\sqrt{3}}{\sqrt{3}} \rightarrow \frac{-2}{\sqrt{3}}$ $\cos\theta = -\frac{\sqrt{3}}{2}$

$\frac{5\pi}{6}, \frac{7\pi}{6}$



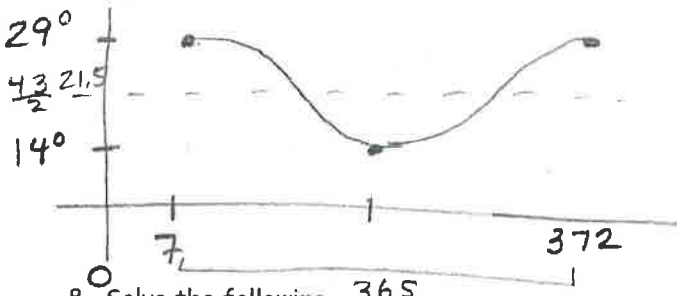
b. $\cot\theta = \frac{-\sqrt{3}}{1}$ $\cot\theta = -\sqrt{3}/2$ $\frac{1}{1/2}$



$\frac{5\pi}{6}$ and $\frac{11\pi}{6}$

7. The hottest day of the year in Santiago, Chile, on average, is January 7, when the average high temperature is $29^\circ C$. (Jan. 7 is in the summer in Santiago). The coolest day of the year has an average temperature of $14^\circ C$. Temperature over time varies sinusoidally. Use 365 days as the length of a year.

a. Draw one full cycle of the graph. Label.



b. Write an equation of the sinusoidal function.

$y = 7.5\cos\frac{2\pi}{365}(x-7) + 21.5$

8. Solve the following

a. $25^{7x+22} = 125$

$(5^2)^{7x+22} = 5^3$

$14x + 44 = 3$

$14x = -41$

$x = -\frac{41}{14}$

b. $\log_2 x - \log_2(x-3) = 3$

$\log_2\frac{x}{x-3} = 3$

$2^3 = \frac{x}{x-3}$

$8 = \frac{x}{x-3}$

$8(x-3) = x$

$8x - 24 = x$

$-24 = -7x$

$x = \frac{24}{7}$

9. Write $P(x) = x^3 - 1000$ as the product of linear factors

$P(x) = (x-10)(x^2+10x+100)$

$P(x) = (x-10)\left(x - (-5 \pm 5i\sqrt{3})\right)$

$x = \frac{-10 \pm \sqrt{100-400}}{2}$

$x = \frac{-10 \pm i\sqrt{300}}{2} \rightarrow \frac{-10 \pm 10i\sqrt{3}}{2}$

$\rightarrow -5 \pm 5i\sqrt{3}$

10. What are the roots of the polynomial $P(x) = x^4 - 6x^3 - 12x^2 + 30x + 35$

$\pm 1, 5, 7, 35$

1]

	1	-6	-12	30	35
↓		1	-5	-17	13
	1	-5	-17	13	☹

5]

	1	-6	-12	30	35
↓		5	-5	-85	
	1	-1	-17	.	☹

7]

	1	-6	-12	30	35
↓		7	7	-35	-35
	1	1	-5	-5	☺

$x = 7$

$x^2 - 5 = 0$

$x = \pm\sqrt{5}$

	5	1	-5	-1	1
		5	0	-5	-1
	1	1	0	-1	0

$x = -1$