Chapter 8 Review Name: ____________________________

All answers must be justified with work. No work, no credit!

1. The angle 140° is equivalent to _____ radians. Write your answer in exact form.

$\frac{140^\circ}{180} = \frac{\theta}{\pi}$

$\frac{180\theta}{180} = \frac{140\pi}{180}$

$\theta = \frac{14\pi}{18}$

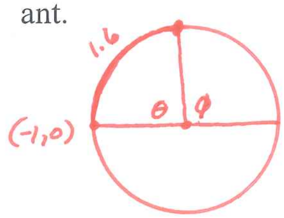
$\boxed{\theta = \frac{7\pi}{9}}$

2. –0.75 rotations around the unit circle corresponds to ______ radians.

$-.75 \times 2\pi$

$-\frac{3}{4} \cdot 2\pi = \boxed{-\frac{3\pi}{2} \text{ or } -1.5\pi}$

3. An ant starts at the point $(-1,0)$ and walks 1.6 units around the unit circle in a clockwise direction. Find the x and y coordinates (accurate to 2 decimal places) of the final local of the ant.



$\theta = \frac{s}{r}$

$= \frac{1.6}{1} = 1.6 \text{ radians}$

$\phi = \pi - 1.6$

$\cos(\pi-1.6), \sin(\pi-1.6)$

$(.0292, .9996)$

$\boxed{(.03, 1.00)}$

4. What is the amplitude, period, midline, horizontal shift, and phase shift of $y = 8\sin(2t-6)+4$?

Amplitude $= \boxed{8}$

Period $= \frac{2\pi}{B} = \frac{2\pi}{2} = \boxed{\pi}$

Midline: $\boxed{y=4}$

Horizontal Shift: $-\frac{C}{B} = \frac{6}{2} = \boxed{3}$

Phase Shift: $-C = \boxed{6}$

5. State the midline and amplitude of the function $y = \dfrac{13-17\sin t}{52}$

$y = \frac{13}{52} - \frac{17}{52}\sin t$

$y = \frac{1}{4} - \frac{17}{52}\sin t$

Midline: $\boxed{y = \frac{1}{4}}$

amplitude $= \boxed{\frac{17}{52}}$

6. For the following function, identify the amplitude, period, horizontal shift, and vertical shift and then graph it from $-3\pi \le t \le \pi$:

$$f(t) = -4\cos(2t + 5\pi) + 1$$

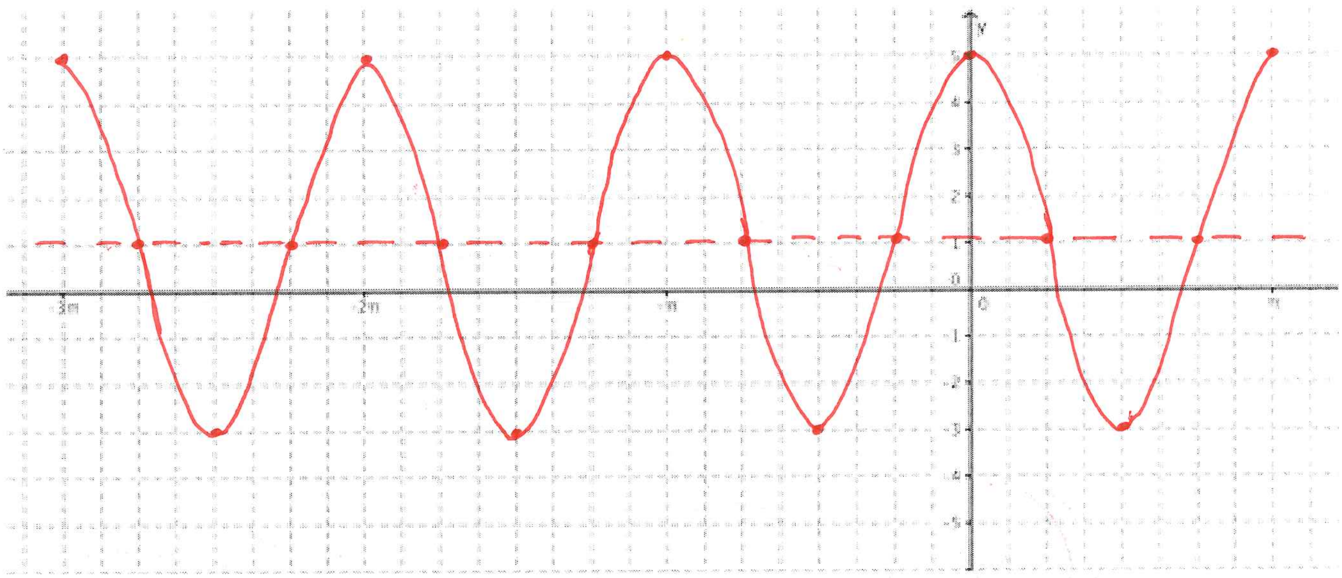
Amplitude $= 4$

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

Horizontal Shift $= -\frac{5\pi}{2}$

Vertical Shift : up 1

Interval: $P \div 4 = \frac{\pi}{4}$



7. Does $\dfrac{\tan^2\theta\cos\theta}{(1-\cos\theta)(1+\cos\theta)} = \dfrac{1}{\cos\theta}$? Yes

$$\frac{\frac{\sin^2\theta}{\cos^2\theta}\cdot\cos\theta}{{}^{*}1-\cos^2\theta} = \frac{\frac{\sin^2\theta}{\cos\theta}}{\sin^2\theta} = \frac{\sin^2\theta}{\cos\theta}\cdot\frac{1}{\sin^2\theta} = \boxed{\frac{1}{\cos\theta}}$$

$*\left(\begin{array}{l}\sin^2\theta + \cos^2\theta = 1 \\ \sin^2\theta = 1 - \cos^2\theta\end{array}\right)$

8. Without a calculator, find the exact value of $\sec 300^\circ$. If it is undefined, enter "undefined".

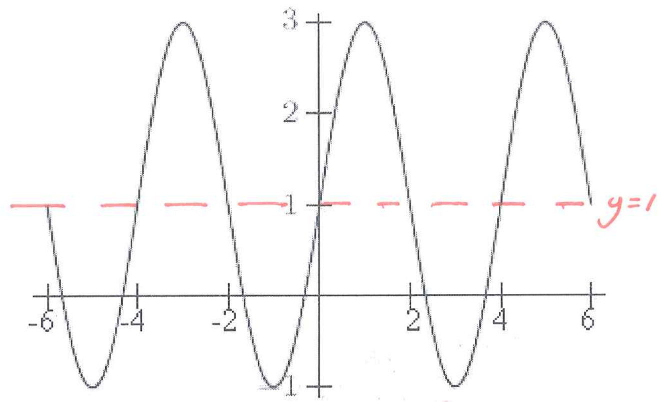
$$\sec 300^\circ = \sec(-60^\circ) = \frac{1}{\cos(-60^\circ)} = \frac{1}{\cos 60^\circ} = \frac{1}{\frac{1}{2}} = \boxed{2}$$

$(\cos(-\theta) = \cos\theta)$

9. Find the phase shift of the sinusoidal function:
$y = 4\sin(7t+3)$

Phase Shift $= -C = \boxed{-3}$

10. The formula for the following trigonometric function is $f(t) =$ <u>2</u> $\sin($ <u>$\frac{\pi}{2}$</u> $\pi t) +$ <u>1</u> .



Amplitude = 2
Period = 4

$P = \frac{2\pi}{B}$

$4 = \frac{2\pi}{B}$

$4B = 2\pi$

$B = \frac{2\pi}{4}$

$B = \frac{\pi}{2}$

11. If $y - 1 = 5\sin t$, find an expression for $\cos t$ in terms of y.

$\sin t = \frac{y-1}{5}$

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

$\left(\frac{y-1}{5}\right)^2 + \cos^2 t = 1$

$\frac{y^2-2y+1}{25} + \cos^2 t = 1$

$\cos^2 t = 1 - \left(\frac{y^2-2y+1}{25}\right)$

$\cos^2 t = \frac{25}{25} - \frac{y^2+2y-1}{25}$

$\cos t = \sqrt{\frac{-y^2-2y+24}{25}}$

$\cos t = \frac{\sqrt{-y^2-2y+24}}{5}$

12. Find a solution in the interval $-\frac{\pi}{2} < \theta < \frac{\pi}{2}$ for $\tan\theta = -40$. Round to 3 decimal places.

$\theta = \tan^{-1}(-40)$

$\boxed{\theta = -1.546}$

13. Use a graph of $y = \sin t$ to estimate the solution to the equation $\sin t = 0.9$ for $\pi/2 \le t \le \pi$. Round to 2 decimal places.

$\sin t = .9$

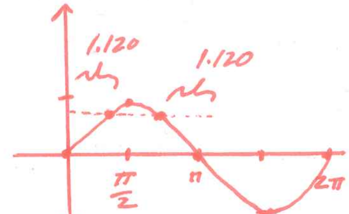
$t = \sin^{-1}(.9)$

$t = 1.120$

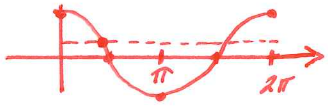
{Between 0 and $\frac{\pi}{2}$}

$t = \pi - 1.120 = \boxed{2.02}$

{Between $\frac{\pi}{2}$ and π}

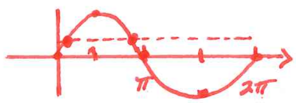


14. How many solutions to $\cos x = \frac{1}{5}$ are there for $0 \le x \le \pi$?



1

15. How many solutions to $\sin x = \frac{1}{3}$ are there for $0 \le x \le \pi$?



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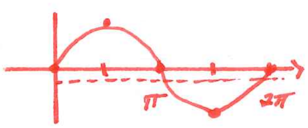
16. How many solutions to $\sin x = \frac{-1}{6}$ are there for $0 \le x \le \pi$?



0

17. Solve $\csc x = 3$ for $0 \le x \le 2\pi$.

$\frac{1}{\sin x} = 3$

$3 \sin x = 1$

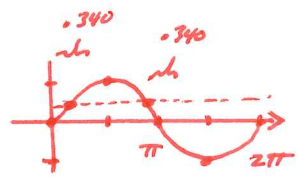
$\sin x = \frac{1}{3}$

$x = \sin^{-1}\left(\frac{1}{3}\right)$

$\boxed{x_1 = .340}$

$x_2 = \pi - .340$

$\boxed{x_2 = 2.802}$



18. The baseball field's usage (in people per week) is seasonal with the peak in mid-July and the low in mid-January. The usage is 2500 in July and 500 in January. Find a trig function $s = f(t)$ representing the usage at time t months after mid-January.

Midline: $\frac{2500 + 500}{2}$

$y = 1500$

Amplitude: $\frac{2500 - 500}{2}$

$= 1000$

Period = 12

$P = \frac{2\pi}{B}$

$12 = \frac{2\pi}{B}$

$12B = 2\pi$

$B = \frac{\pi}{6}$

Reflected cosine (low comes 1st)

$\boxed{y = -1000 \cos\left(\frac{\pi}{6} t\right) + 1500}$

19. Find the solutions to $2\cos t = 0.15$ for $-2\pi < t < -\pi$. Give answers correct to 3 decimal places.

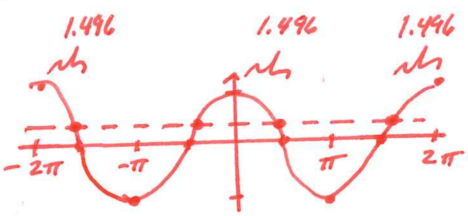
$2\cos t = .15$

$\cos t = .075$

$t = \cos^{-1}(.075)$

$t = 1.496$

$-2\pi + 1.496 = \boxed{-4.787}$



ALL SOLUTIONS!

$\boxed{t = \begin{cases} 1.496 + 2k\pi \\ 4.787 + 2k\pi \end{cases}}$