

Class Name : **Math 127 - Fall 2020 - 3007**Instructor Name : **Scheib**Student Name : Answer Key

Instructor Note :

Question 1 of 18Convert -210° from degrees to radians. Give the answer in exact form in terms of π .

$$-210^\circ$$

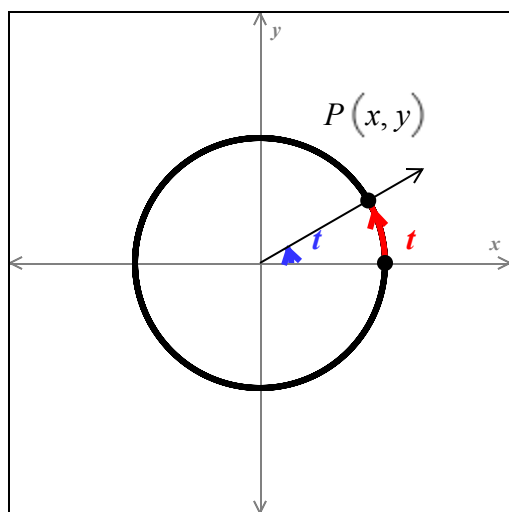
$$-210^\circ = \square$$

Question 2 of 18Convert $-\frac{4\pi}{5}$ from radians to decimal degrees. Round to 1 decimal place if necessary.

$$-\frac{4\pi}{5} = \square$$

Question 3 of 18Find an angle between 0° and 360° that is coterminal to 592° .The angle \square° is coterminal to 592° .**Question 4 of 18**

The real number t corresponds to the point P on the unit circle. Identify the coordinates of point P . Then evaluate the six trigonometric functions of t . Write your answer as a simplified fraction, if necessary. Rationalize the denominator, if necessary.



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

Part 1 of 7

$$P(x, y) = \square$$

Part 2 of 7

$$\sin t = \square$$

Part 3 of 7

$$\cos t = \square$$

Part 4 of 7

$$\csc t = \square$$

Part 5 of 7

$$\sec t = \square$$

Part 6 of 7

$$\tan t = \square$$

Part 7 of 7

$$\cot t = \square$$

Question 5 of 18

Evaluate the function if possible. Select "Undefined" where applicable.

(a) $\csc \frac{\pi}{2}$

(b) $\sec 3\pi$

(c) $\cot \frac{3\pi}{2}$

(d) $\tan 3\pi$

(e) $\sin 3\pi$

(f) $\cos \frac{7\pi}{2}$

Part 1 of 6

$$\csc \frac{\pi}{2} = \square$$

Part 2 of 6

$$\sec 3\pi = \square$$

Part 3 of 6

$$\cot \frac{3\pi}{2} = \square$$

Part 4 of 6

$$\tan 3\pi = \square$$

Part 5 of 6

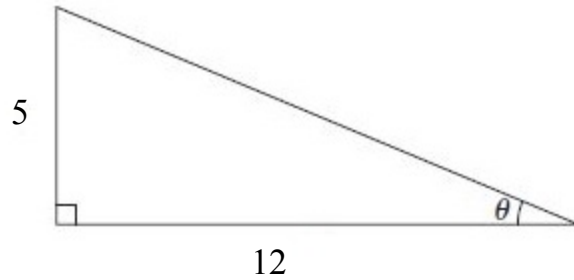
$$\sin 3\pi = \square$$

Part 6 of 6

$$\cos \frac{7\pi}{2} = \square$$

Question 6 of 18

First use the Pythagorean theorem to find the exact length of the missing side. Then find the exact values of the six trigonometric functions for angle θ .



Part 1 of 2

The length of the hypotenuse is .

Part 2 of 2

$$\sin \theta = \text{$$

$$\csc \theta = \text{$$

$$\cos \theta = \text{$$

$$\sec \theta = \text{$$

$$\tan \theta = \text{$$

$$\cot \theta = \text{$$

Question 7 of 18

A point is given on the terminal side of an angle θ drawn in standard position. Find the values of the six trigonometric functions of θ . Simplify your answers as much as possible. Rationalize the denominator, if necessary.

$(-5, -6)$

Part 1 of 6

$$\sin \theta = \square$$

Part 2 of 6

$$\cos \theta = \square$$

Part 3 of 6

$$\tan \theta = \square$$

Part 4 of 6

$$\csc \theta = \square$$

Part 5 of 6

$$\sec \theta = \square$$

$$\cot \theta = \square$$

Question 8 of 18

Find the reference angle for the given angles. Express your answers in radians.

(a) $-\frac{7\pi}{6}$

(b) $\frac{7\pi}{4}$

(c) $\frac{23\pi}{4}$

(d) $\frac{13\pi}{4}$

(a) $-\frac{7\pi}{6}$

$$\theta' = \square$$

(b) $\frac{7\pi}{4}$

$$\theta' = \square$$

Part 3 of 4

(c) $\frac{23\pi}{4}$

$$\theta' = \square$$

Part 4 of 4

(d) $\frac{13\pi}{4}$

$$\theta' = \square$$

Question 9 of 18

Use reference angles to find the exact value. Rationalize the denominator of your answer, if needed. Select "Undefined" if applicable.

$$\tan(-210^\circ)$$

$$\tan(-210^\circ) = \square$$

Question 10 of 18

Use reference angles to find the exact value. Rationalize the denominator of your answer, if needed. Select "Undefined" if applicable.

$$\sec 8\pi$$

$$\sec 8\pi = \square$$

Question 11 of 18

Use fundamental trigonometric identities to find the values of the functions. Simplify your answers as much as possible.

Given $\sin \theta = -\frac{8}{17}$ for θ in Quadrant III, find $\cos \theta$ and $\cot \theta$.

Part 1 of 2

$$\cos \theta = \boxed{}$$

Part 2 of 2

$$\cot \theta = \boxed{}$$

Question 12 of 18

Answer the following questions for $y = \sin\left(3x - \frac{\pi}{4}\right)$. Express your answers as simplified fractions if necessary and express points as ordered pairs.

- (a) Identify the amplitude, period, and phase shift.
- (b) Graph the function and identify the key points on one full period.

Part 1 of 4

(a) Identify the amplitude, period, and phase shift.

The amplitude is $\boxed{}$.

Part 2 of 4

The period is .

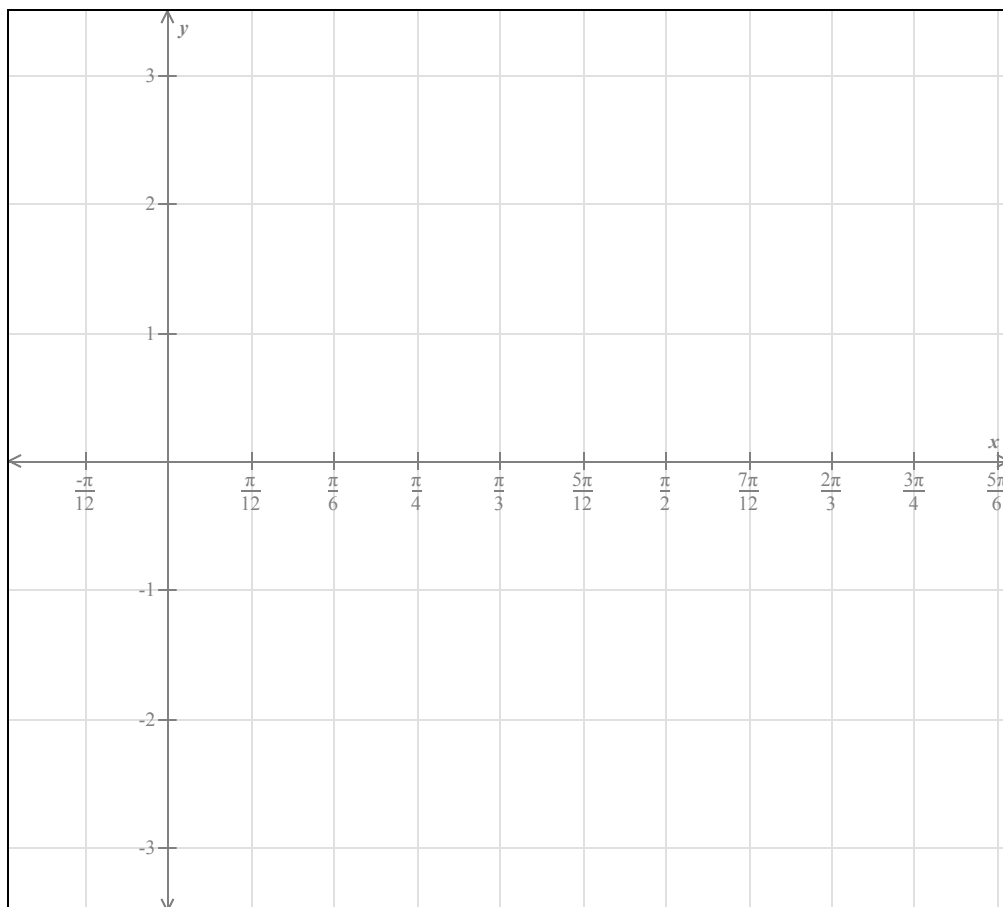
Part 3 of 4

The phase shift is .

Part 4 of 4

(b) Graph the function and identify the key points on one full period.

To draw the graph, plot all points corresponding to the relative minima, relative maxima, and x -intercepts within one cycle. Then click on the graph icon.

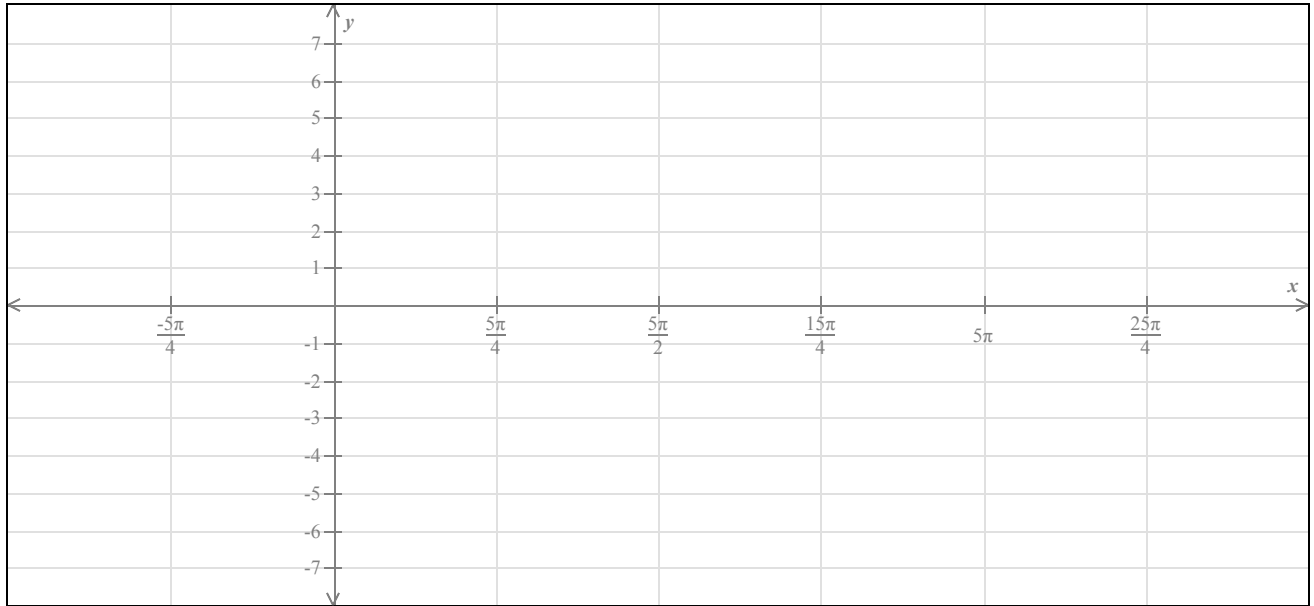


Question 13 of 18

Graph the Function.

$$y = \cot\left(\frac{1}{5}x\right)$$

To draw the graph, plot two consecutive asymptotes. Between those asymptotes, first plot a point corresponding to an x -intercept. Then plot two additional points, one on each side of the first point. Then click on the graph icon.



Question 14 of 18

Find the exact value or state that the expression is undefined.

$$\tan^{-1}(-\sqrt{3})$$

$$\tan^{-1}(-\sqrt{3}) = \square$$

Question 15 of 18

Find the exact value or state that the expression is undefined.

$$\cos^{-1}(0)$$

$$\cos^{-1}(0) = \square$$

Question 16 of 18

Find the exact value. Write your answer using a simplified fraction and rationalize the denominator, if necessary.

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

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

Question 17 of 18

Find the exact value. Write your answer using a simplified fraction and rationalize the denominator, if necessary.

$$\cos \left[\sin^{-1} \left(-\frac{5}{7} \right) \right]$$

$$\cos \left[\sin^{-1} \left(-\frac{5}{7} \right) \right] = \boxed{}$$

Question 18 of 18

Write the expression $\sin \left(\cos^{-1} \frac{\sqrt{x^2 - 16}}{x} \right)$ as an algebraic expression for $x > 4$. It is not necessary to rationalize the denominator.

$$\sin \left(\cos^{-1} \frac{\sqrt{x^2 - 16}}{x} \right) = \boxed{}$$

$$1) -\frac{210^\circ}{7} \cdot \frac{\pi}{6} = -\frac{7\pi}{6}$$

$$2) -\frac{4\pi}{8} \cdot \frac{144^\circ}{\pi} = -144^\circ$$

$$3) 592^\circ - 360^\circ = 232^\circ$$

$$4) i) y = \sin \frac{\pi}{6} = \frac{1}{2}$$

$$x = \cos \frac{\pi}{6} = \frac{\sqrt{3}}{2}$$

$$P(x, y) = \left(\frac{\sqrt{3}}{2}, \frac{1}{2} \right)$$

$$ii) \sin t = \frac{1}{2}$$

$$iii) \cos t = \frac{\sqrt{3}}{2}$$

$$iv) \csc t = \frac{1}{\sin t} = \frac{2}{1} = 2$$

$$v) \sec t = \frac{1}{\cos t} = \frac{2 \cdot \sqrt{3}}{\sqrt{3} \cdot \sqrt{3}} = \frac{2\sqrt{3}}{3}$$

$$vi) \tan t = \frac{\sin t}{\cos t} = \frac{\frac{1}{2}}{\frac{\sqrt{3}}{2}} = \frac{1 \cdot \sqrt{3}}{\sqrt{3} \cdot \sqrt{3}} = \frac{\sqrt{3}}{3}$$

$$vii) \cot t = \frac{1}{\tan t} = \frac{\sqrt{3}}{1} = \sqrt{3}$$

$$5) a) \csc \frac{\pi}{2} = \frac{1}{\sin \frac{\pi}{2}} = \frac{1}{1} = 1$$

$$b) \sec 3\pi = \frac{1}{\cos 3\pi} = \frac{1}{-1} = -1$$

$$c) \cot \frac{3\pi}{2} = \frac{\cos \frac{3\pi}{2}}{\sin \frac{3\pi}{2}} = \frac{0}{-1} = 0$$

$$d) \tan 3\pi = \frac{\sin 3\pi}{\cos 3\pi} = \frac{0}{-1} = 0$$

$$e) \sin 3\pi = 0$$

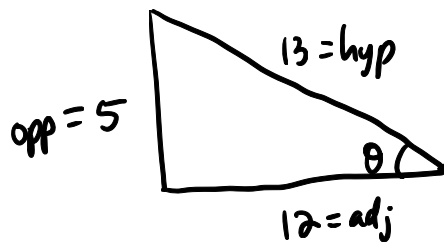
$$f) \cos \frac{7\pi}{2} = \cos \frac{3\pi}{2} = 0$$

$$6) i) 5^2 + 12^2 = c^2$$

$$25 + 144 = c^2$$

$$169 = c^2$$

$$c = 13$$



$$ii) \sin \theta = \frac{\text{opp}}{\text{hyp}} = \frac{5}{13}$$

$$\cos \theta = \frac{\text{adj}}{\text{hyp}} = \frac{12}{13}$$

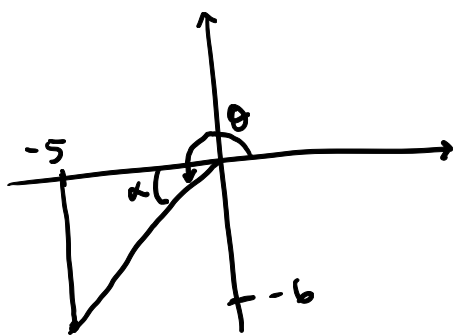
$$\tan \theta = \frac{\text{opp}}{\text{adj}} = \frac{5}{12}$$

$$\csc \theta = \frac{1}{\sin \theta} = \frac{13}{5}$$

$$\sec \theta = \frac{1}{\cos \theta} = \frac{13}{12}$$

$$\cot \theta = \frac{1}{\tan \theta} = \frac{12}{5}$$

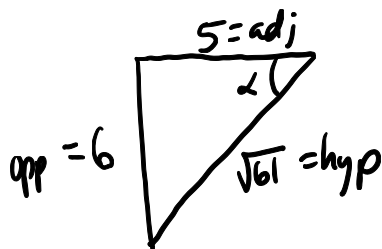
7)



Quad III

$\tan \theta, \cot \theta > 0$

all others < 0



$$5^2 + 6^2 = c^2$$

$$25 + 36 = c^2$$

$$61 = c^2$$

$$c = \sqrt{61}$$

$$\sin \alpha = \frac{\text{opp}}{\text{hyp}} = \frac{6 \cdot \sqrt{61}}{\sqrt{61} \cdot \sqrt{61}} = \frac{6\sqrt{61}}{61}$$

$$\cos \alpha = \frac{\text{adj}}{\text{hyp}} = \frac{5 \cdot \sqrt{61}}{\sqrt{61} \cdot \sqrt{61}} = \frac{5\sqrt{61}}{61}$$

$$\tan \alpha = \frac{\text{opp}}{\text{adj}} = \frac{6}{5}$$

$$i) \sin \theta = -\frac{6\sqrt{61}}{61}$$

$$ii) \cos \theta = -\frac{5\sqrt{61}}{61}$$

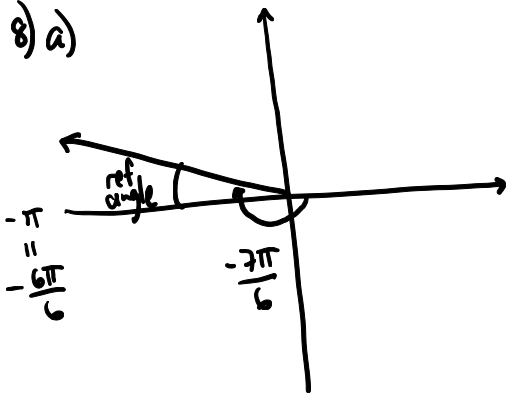
$$\text{iii) } \tan \theta = \frac{6}{5}$$

$$\text{iv) } \csc \theta = \frac{1}{\sin \theta} = -\frac{\sqrt{61}}{6}$$

$$\text{v) } \sec \theta = \frac{1}{\cos \theta} = -\frac{\sqrt{61}}{5}$$

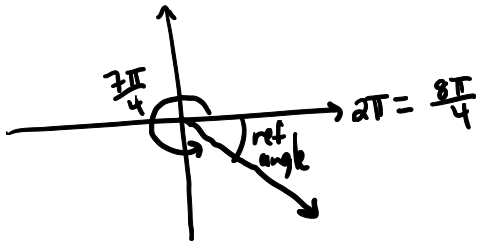
$$\text{vi) } \cot \theta = \frac{1}{\tan \theta} = \frac{5}{6}$$

8) a)



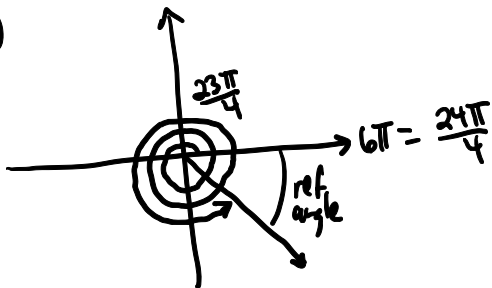
$$-\frac{6\pi}{6} - \left(-\frac{7\pi}{6}\right) = \frac{\pi}{6}$$

b)



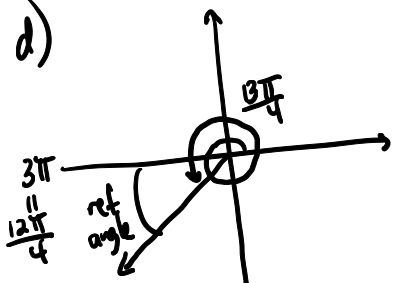
$$\frac{8\pi}{4} - \frac{7\pi}{4} = \frac{\pi}{4}$$

c)

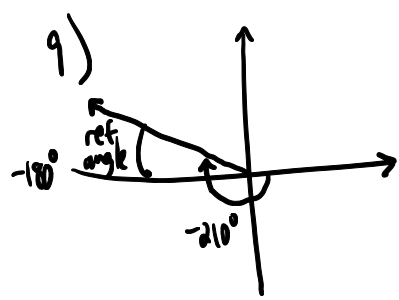


$$\frac{24\pi}{4} - \frac{23\pi}{4} = \frac{\pi}{4}$$

d)



$$\frac{13\pi}{4} - \frac{12\pi}{4} = \frac{\pi}{4}$$



$$-180^\circ - (-210^\circ) = 30^\circ$$

Quad II \Rightarrow tangent < 0

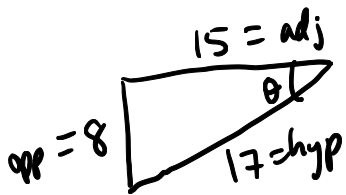
$$\tan 30^\circ = \frac{\sin 30^\circ}{\cos 30^\circ} = \frac{\frac{1}{2}}{\frac{\sqrt{3}}{2}} = \frac{1 \cdot \sqrt{3}}{\sqrt{3} \cdot \sqrt{3}} = \frac{\sqrt{3}}{3}$$

$$\tan(-210^\circ) = -\frac{\sqrt{3}}{3}$$

10) $\sec 8\pi = \frac{1}{\cos 8\pi} = \frac{1}{1} = 1$

11) Quad III \Rightarrow $\tan \theta, \cot \theta > 0$
all others < 0

$$\sin \theta = -\frac{8 \leftarrow \text{opp}}{17 \leftarrow \text{hyp}}$$



$$a^2 + 8^2 = 17^2$$

$$a^2 + 64 = 289$$

$$a^2 = 225$$

$$a = 15$$

i) $\cos \theta = -\frac{\text{adj}}{\text{hyp}} = -\frac{15}{17}$

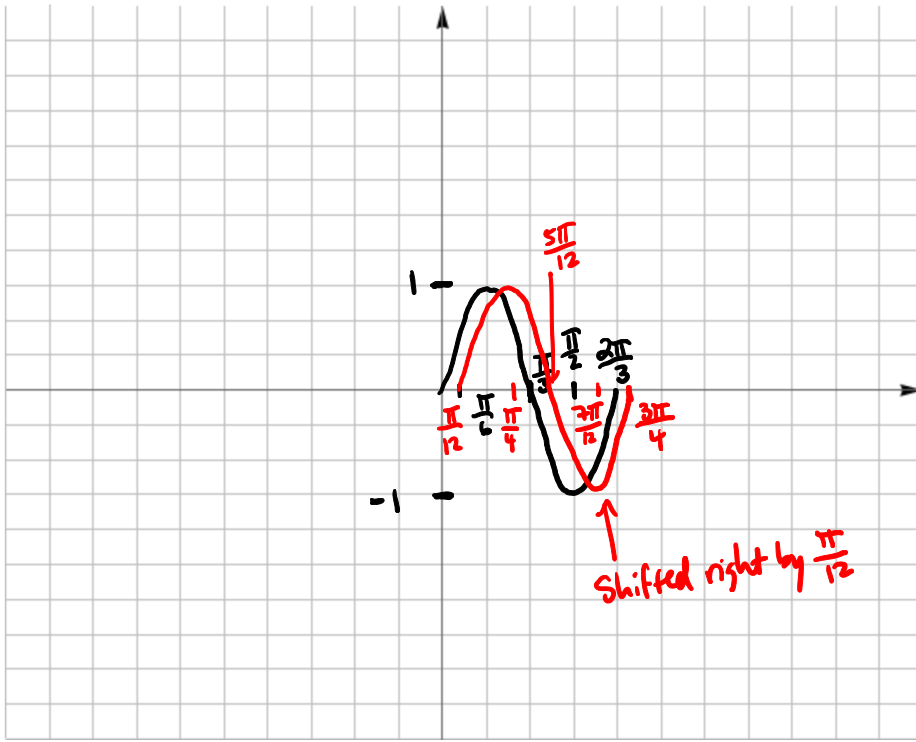
ii) $\cot \theta = \frac{\text{adj}}{\text{opp}} = \frac{15}{8}$

12) i) amplitude = 1

ii) period = $\frac{2\pi}{3}$

iii) $\frac{\pi}{4} = \frac{\pi}{12}$ right

iv)



$$\frac{\pi}{6} + \frac{\pi}{12} = \frac{2\pi}{12} + \frac{\pi}{12} = \frac{3\pi}{12} = \frac{\pi}{4}$$

$$\frac{\pi}{3} + \frac{\pi}{12} = \frac{4\pi}{12} + \frac{\pi}{12} = \frac{5\pi}{12}$$

$$\frac{\pi}{2} + \frac{\pi}{12} = \frac{6\pi}{12} + \frac{\pi}{12} = \frac{7\pi}{12}$$

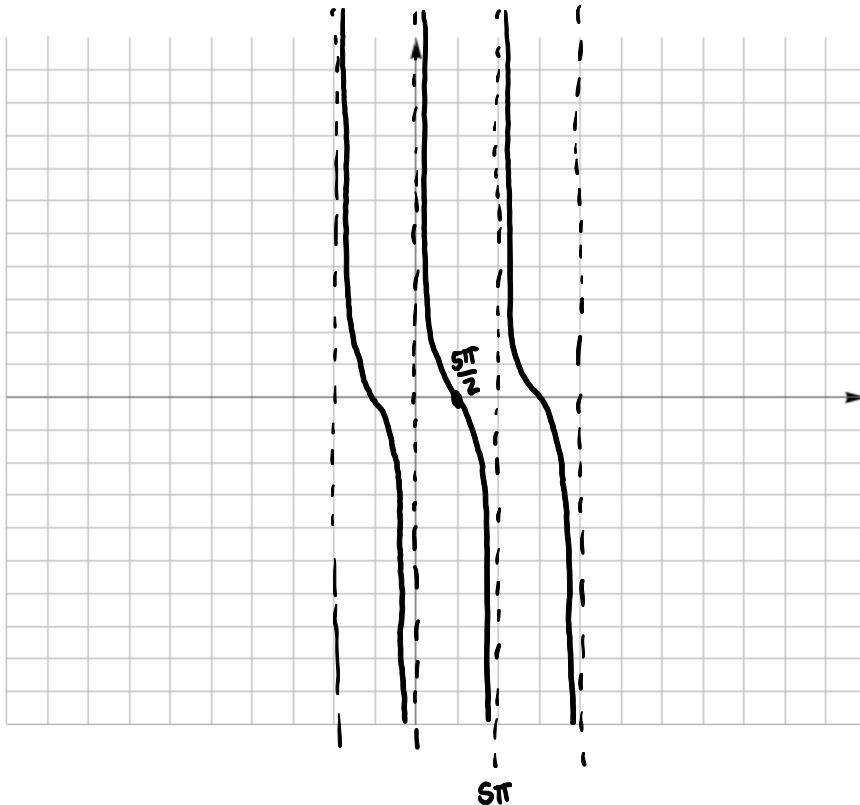
$$\frac{2\pi}{3} + \frac{\pi}{12} = \frac{8\pi}{12} + \frac{\pi}{12} = \frac{9\pi}{12} = \frac{3\pi}{4}$$

$$\frac{\pi}{6} + \frac{\pi}{12} = \frac{2\pi}{12} + \frac{\pi}{12} = \frac{3\pi}{12} = \frac{\pi}{4}$$

$$\frac{\pi}{3} + \frac{\pi}{12} = \frac{4\pi}{12} + \frac{\pi}{12} = \frac{5\pi}{12}$$

$$\frac{\pi}{2} + \frac{\pi}{12} = \frac{6\pi}{12} + \frac{\pi}{12} = \frac{7\pi}{12}$$

13) period = $\frac{\pi}{\frac{1}{5}} = 5\pi$



$$\frac{\pi}{2} - \frac{\pi}{5} = \frac{5\pi}{10} - \frac{2\pi}{10} = \frac{3\pi}{10}$$

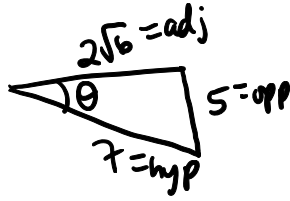
14) $\tan^{-1}(-\sqrt{3})$

$$\tan \theta = -\sqrt{3} \Rightarrow \frac{\sin \theta}{\cos \theta} = \frac{\frac{\sqrt{3}}{2}}{\frac{1}{2}} \Rightarrow \theta = \frac{\pi}{3} \Rightarrow \boxed{\frac{\pi}{3}}$$

$$15) \cos^{-1}(0) \Rightarrow \cos \theta = 0 \Rightarrow \theta = \frac{\pi}{2}$$

$$16) \sin \left[\sin^{-1} \left(-\frac{\sqrt{3}}{2} \right) \right] = -\frac{\sqrt{3}}{2}$$

$$17) \cos \left[\underbrace{\sin^{-1} \left(-\frac{5}{7} \right)}_{\text{Quad IV}} \right]$$



$$5^2 + b^2 = 7^2$$

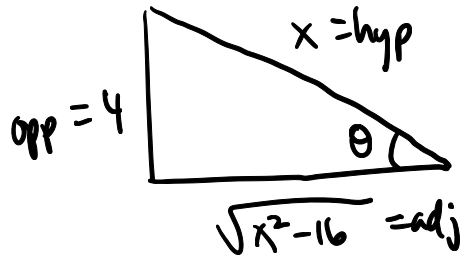
$$25 + b^2 = 49$$

$$b^2 = 24$$

$$b = \sqrt{24} = 2\sqrt{6}$$

$$\cos \theta = \frac{\text{adj}}{\text{hyp}} = \frac{2\sqrt{6}}{7}$$

$$18) \sin \left(\cos^{-1} \frac{\sqrt{x^2 - 16}}{x} \right)$$



$$\left(\sqrt{x^2 - 16} \right)^2 + b^2 = x^2$$

$$x^2 - 16 + b^2 = x^2$$

$$-16 + b^2 = 0$$

$$b^2 = 16$$

$$b = 4$$

$$\sin \theta = \frac{\text{opp}}{\text{hyp}} = \frac{4}{x}$$