



MATH 150 - WEEK-IN-REVIEW 5

ALEXANDRA L. FORAN

PROBLEM STATEMENTS

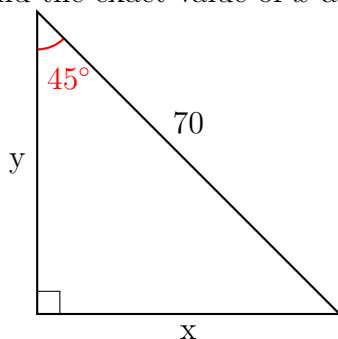
You should attempt the problems yourself first. The next section contains the solutions.

- Convert 75° to radians.
- A circular sector created by a central angle of $\frac{3}{5}$ radians has an area of 1080 ft^2 , determine the radius of the circle.
- The planet Neptune has an orbit that is nearly circular. It orbits the Sun at a distance of 4497 million kilometers and completes one revolution every 165 years. How long is a full path of Neptune around the Sun? Then find the linear velocity of Neptune as it orbits the Sun.
- Evaluate the six trigonometric functions for the following angles:
 - $\sin \frac{4\pi}{3}$
 - $\cos \frac{4\pi}{3}$
 - $\tan \frac{4\pi}{3}$
 - $\cot \frac{4\pi}{3}$
 - $\sec \frac{4\pi}{3}$
 - $\csc \frac{4\pi}{3}$
 - $\sin 315^\circ$
 - $\cos 315^\circ$
 - $\tan 315^\circ$
 - $\cot 315^\circ$
 - $\sec 315^\circ$
 - $\csc 315^\circ$
- Find the exact value of the six trigonometric functions, given the following:
hypotenuse = 29, side opposite the angle = 21
- Given $\sin \theta = \frac{4}{7}$ and θ in Q1, use the trigonometric identities to find the exact value of each:
 - $\cos(\theta) =$
 - $\cot(\theta) =$
 - $\csc(\theta) =$
 - $\tan(90^\circ - \theta) =$



7. From a point on the ground 47 feet from the foot of a tree, the angle of elevation of the top of the tree is 30° . Find the height of the tree.

8. Find the exact value of x and y .



9. Let $(-24, 7)$ be a point on the terminal side of θ . Find the sine, cosine, and tangent of θ .

10. Let $(3, -8)$ be a point on the terminal side of θ . Find the sine, cosine, and tangent of θ .

11. Given $\sin(\theta) = -\frac{5}{7}$ and $\tan(\theta) > 0$, find $\tan(\theta)$ and $\sec(\theta)$.

12. Find the reference angle for:

a) $\theta = 330^\circ$.

b) $\theta = \frac{7\pi}{4}$.

c) $\theta = \frac{13\pi}{9}$.

d) $\theta = -255^\circ$.

13. Use the function value to find the indicated trigonometric value in the specified quadrant.

Function Value: $\sec \theta = -\frac{61}{11}$ **Quadrant:** III **Trigonometric Function:** $\tan \theta$

14. Given $y = 3 \sin(4x + \pi)$, describe the period, amplitude, and phase shift of the graph. Then graph the function.

Period:

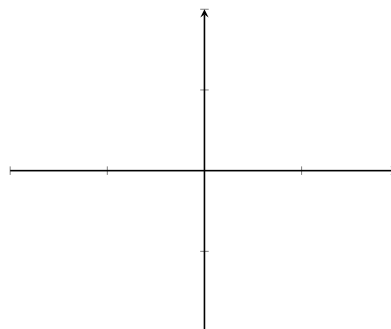
Amplitude:

Phase Shift:

Period Endpoints

Start:

End:





15. Write an equation for a function with the given characteristics. A sine curve with a period of π , an amplitude of 6, a right phase shift of 3π .

16. Given $y = \frac{1}{2} \cos\left(\frac{\pi}{2}x - 3\pi\right)$, describe the period, amplitude, and phase shift of the graph. Then graph the function.

Period:

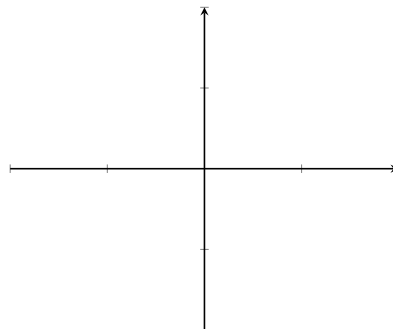
Amplitude:

Phase Shift:

Period Endpoints

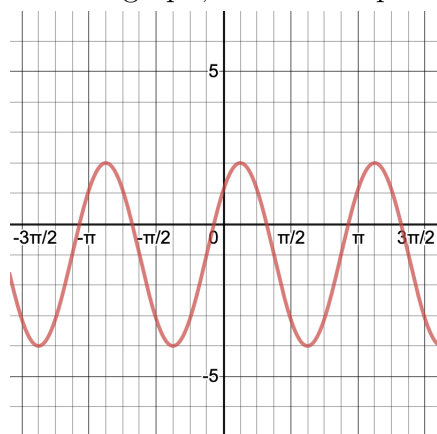
Start:

End:

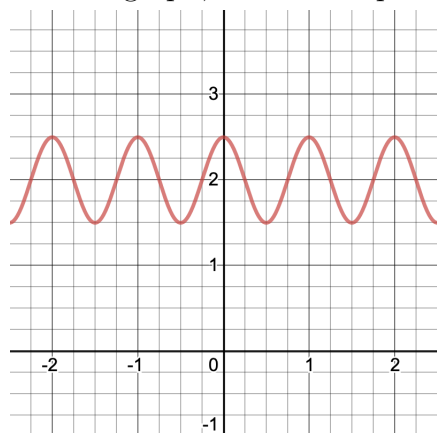


17. Write an equation for a function with the given characteristics. A cosine curve with a period of 3, an amplitude of $\frac{1}{4}$, and a vertical translation down 7 units.

18. Given the graph, write the equation of the sine function which matches the graph.



19. Given the graph, write the equation of the cosine function which matches the graph.





SOLUTIONS

Click the boxed answer (also in red) to watch the video solution. You can also see them all by viewing the [Week 5 playlist \(clickable link\)](#). You can turn on closed captions by clicking “CC” inside YouTube as well as adjust the video speed inside of “Settings” by clicking the cog in the bottom right of the player.

1. Convert 75° to radians. $\frac{5\pi}{12}$ radians

2. A circular sector created by a central angle of $\frac{3}{5}$ radians has an area of 1080 ft^2 , determine the radius of the circle. 60 ft

3. The planet Neptune has an orbit that is nearly circular. It orbits the Sun at a distance of 4497 million kilometers and completes one revolution every 165 years. How long is a full path of Neptune around the Sun? Then find the linear velocity of Neptune as it orbits the Sun.

$$\frac{8994\pi}{165} \text{ km/yr}$$

4. Evaluate the six trigonometric functions for the following angles:

$$\text{a) } \sin \frac{4\pi}{3} = \frac{\sqrt{3}}{2}$$

$$\text{b) } \cos \frac{4\pi}{3} = \frac{1}{2}$$

$$\text{c) } \tan \frac{4\pi}{3} = \sqrt{3}$$

$$\text{d) } \cot \frac{4\pi}{3} = \frac{1}{\sqrt{3}}$$

$$\text{e) } \sec \frac{4\pi}{3} = 2$$

$$\text{f) } \csc \frac{4\pi}{3} = \frac{2}{\sqrt{3}}$$

$$\text{a) } \sin 315^\circ = -\frac{\sqrt{2}}{2}$$

$$\text{b) } \cos 315^\circ = \frac{\sqrt{2}}{2}$$

$$\text{c) } \tan 315^\circ = -1$$

$$\text{d) } \cot 315^\circ = -1$$

$$\text{e) } \sec 315^\circ = \sqrt{2}$$

$$\text{f) } \csc 315^\circ = -\sqrt{2}$$



5. Find the exact value of the six trigonometric functions, given the following:

hypotenuse = 29, side opposite the angle = 21

$$\sin \theta = \frac{21}{29} \quad \sec \theta = \frac{29}{20}$$

$$\cos \theta = \frac{20}{29} \quad \csc \theta = \frac{29}{21}$$

$$\tan \theta = \frac{20}{21} \quad \cot \theta = \frac{21}{20}$$

6. Given $\sin \theta = \frac{4}{7}$ and θ in Q1, use the trigonometric identities to find the exact value of each:

$$\cos \theta = \frac{\sqrt{33}}{7}$$

$$\cot \theta = \frac{\sqrt{33}}{4}$$

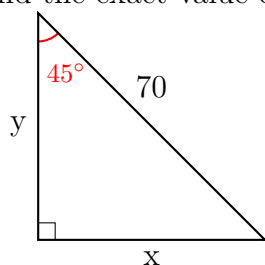
$$\csc \theta = \frac{7}{4}$$

$$\tan(90^\circ - \theta) = \frac{\sqrt{33}}{4}$$

7. From a point on the ground 47 feet from the foot of a tree, the angle of elevation of the top of the tree is 30° . Find the height of the tree.

$$\frac{47}{\sqrt{3}} \text{ ft}$$

8. Find the exact value of x and y .



$$x = \frac{70}{\sqrt{2}}, y = \frac{70}{\sqrt{2}}$$

9. Let $(-24, 7)$ be a point on the terminal side of θ . Find the sine, cosine, and tangent of θ .

$$\sin \theta = \frac{7}{25}$$

$$\cos \theta = -\frac{24}{25}$$

$$\tan \theta = -\frac{7}{24}$$



10. Let $(3, -8)$ be a point on the terminal side of θ . Find the sine, cosine, and tangent of θ .

$$\sin \theta = -\frac{8}{\sqrt{73}}$$

$$\cos \theta = -\frac{3}{\sqrt{73}}$$

$$\tan \theta = -\frac{8}{3}$$

11. Given $\sin(\theta) = -\frac{5}{7}$ and $\tan(\theta) > 0$, find $\tan(\theta)$ and $\sec(\theta)$.

$$\tan \theta = \frac{5}{2\sqrt{6}}$$

$$\sec \theta = -\frac{7}{2\sqrt{6}}$$

12. Find the reference angle for:

a) $\theta = 330^\circ$

$$= 30^\circ$$

b) $\theta = \frac{7\pi}{4}$

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

c) $\theta = \frac{13\pi}{9}$

$$= \frac{4\pi}{9}$$

d) $\theta = -255^\circ$

$$= 75^\circ$$

13. Given $y = 3 \sin(4x + \pi)$, describe the period, amplitude, and phase shift of the graph. Then graph the function.

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

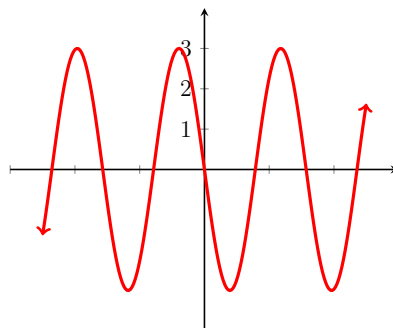
Amplitude: 3

Phase shift: Left $\frac{\pi}{4}$

Period Endpoints

Start: $-\frac{\pi}{4}$

End: $\frac{\pi}{4}$



14. Write an equation for a function with the given characteristics. A sine curve with a period of π , an amplitude of 6, a right phase shift of 3π .

$$y = 6 \sin(2x - 6\pi)$$



15. Given $y = \frac{1}{2} \cos\left(\frac{\pi}{2}x - 3\pi\right)$, describe the period, amplitude, and phase shift of the graph. Then graph the function.

Period: 4

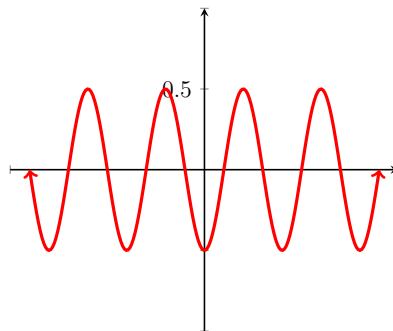
Amplitude: $\frac{1}{2}$

Phase shift: Right 6

Period Endpoints

Start: 6

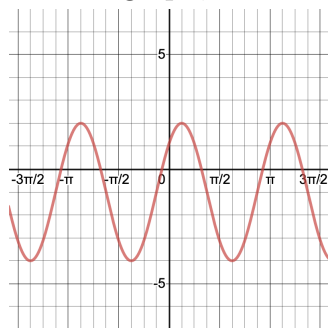
End: 10



16. Write an equation for a function with the given characteristics. A cosine curve with a period of 3, an amplitude of $\frac{1}{4}$, and a vertical translation down 7 units.

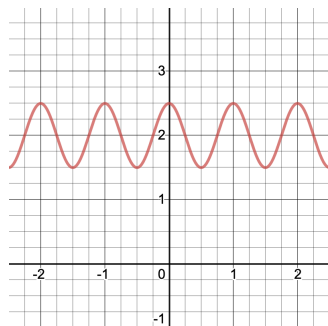
$$y = \frac{1}{4} \cos\left(\frac{2\pi}{3}\right) - 7$$

17. Given the graph, write the equation of the sine function which matches the graph.



$$y = 3 \sin\left(2x - \frac{\pi}{4}\right) - 1$$

18. Given the graph, write the equation of the cosine function which matches the graph.



$$y = \frac{1}{2} \cos(2\pi x) + 2$$