Student: Cole Lamers **Date:** 07/10/19	**Instructor:** Kelly Galarneau **Course:** CA&T Internet (70263) Galarneau	**Assignment:** 5.3 Trig Functions of Any Angle; The Unit Circle

1. Complete the following statement.

   For a point P(x,y) on the terminal side of an angle θ in standard position, we let r = _____. Then **sin** θ = _____, **cos** θ = _____, and **tan** θ = _____.

   r = $\sqrt{x^2 + y^2}$

   sin θ = $\frac{y}{r}$

   cos θ = $\frac{x}{r}$

   tan θ = $\frac{y}{x}$

2. Complete the following statement.

   The reference angle θ' for a nonquadrantal angle θ in standard position is the acute angle formed by the terminal side of θ and the _____.

   The reference angle θ' for a nonquadrantal angle θ in standard position is the acute angle formed by the terminal side of θ and the x-axis.

3. A point on the terminal side of angle θ is given. Find the exact values of the six trigonometric functions of θ.

$(-5,12)$

Select the correct choice below and fill in any answer boxes within your choice.

A. $\sin\theta = \frac{12}{13}$

(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

B. The function is undefined.

Select the correct choice below and fill in any answer boxes within your choice.

A. $\cos\theta = -\frac{5}{13}$

(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

B. The function is undefined.

Select the correct choice below and fill in any answer boxes within your choice.

A. $\tan\theta = \frac{12}{-5}$

(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

B. The function is undefined.

Select the correct choice below and fill in any answer boxes within your choice.

A. $\cot\theta = -\frac{5}{12}$

(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

B. The function is undefined.

Select the correct choice below and fill in any answer boxes within your choice.

A. $\sec\theta = -\frac{13}{5}$

(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

B. The function is undefined.

Select the correct choice below and fill in any answer boxes within your choice.

A. $\csc\theta = \frac{13}{12}$

(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

B. The function is undefined.

4. A point on the terminal side of angle θ is given. Find the exact values of the six trigonometric functions of θ.

$(24, -7)$

Select the correct choice below and fill in any answer boxes within your choice.

A. $\sin\theta = -\frac{7}{25}$

(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

B. The function is undefined.

Select the correct choice below and fill in any answer boxes within your choice.

A. $\cos\theta = \frac{24}{25}$

(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

B. The function is undefined.

Select the correct choice below and fill in any answer boxes within your choice.

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

(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

B. The function is undefined.

Select the correct choice below and fill in any answer boxes within your choice.

A. $\cot\theta = -\frac{24}{7}$

(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

B. The function is undefined.

Select the correct choice below and fill in any answer boxes within your choice.

A. $\sec\theta = \frac{25}{24}$

(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

B. The function is undefined.

Select the correct choice below and fill in any answer boxes within your choice.

A. $\csc\theta = \frac{25}{-7}$

(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

B. The function is undefined.

5. The terminal side of θ in standard position contains the point $(-9,9)$. Find the values of the six trigonometric functions of θ.

sin $\theta =$ $\frac{\sqrt{2}}{2}$

(Type an exact answer, using radicals as needed. Rationalize the denominator.)

cos $\theta =$ $-\frac{\sqrt{2}}{2}$

(Type an exact answer, using radicals as needed. Rationalize the denominator.)

tan $\theta =$ -1

(Type an exact answer, using radicals as needed. Rationalize the denominator.)

csc $\theta =$ $\sqrt{2}$

(Type an exact answer, using radicals as needed. Rationalize the denominator.)

sec $\theta =$ $-\sqrt{2}$

(Type an exact answer, using radicals as needed. Rationalize the denominator.)

cot $\theta =$ -1

(Type an exact answer, using radicals as needed. Rationalize the denominator.)

6. Find the exact value of the quadrantal angle.

sin 540°

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- **A.** **sin** $540^\circ =$ 0
- **B.** The value is undefined.

7. Use the reference angle to find the exact value of the following expression. Do not use a calculator.

cos(180°)

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- **A.** **cos**$(180^\circ) =$ -1

  (Simplify your answer including any radicals. Use integers or fractions for any numbers in the expression.)
- **B.** The answer is undefined.

8. Find the exact value.

tan (-990°)

Select the correct choice below and fill in any answer boxes in your choice.

- **A.** **tan** $(-990^\circ) =$

  (Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)
- **B.** The answer is undefined.

9. Find the exact value of **tan** (-60°).

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- **A.** The exact value of **tan** (-60°) is $-\sqrt{3}$.

  (Type an exact answer, using radicals as needed. Use integers or fractions for any numbers in the expression. Rationalize all denominators.)
- **B.** The value of **tan** (-60°) is undefined.

10. Find the exact value. Do not use a calculator.

cos (8π)

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

A. **cos** $(8\pi) =$ 1
(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

B. The answer is undefined.

11. Find the exact value. Do not use a calculator.

tan (14π)

Select the correct choice below and fill in any answer boxes in your choice.

A. **tan** $(14\pi) =$ 0
(Type an exact answer, using radicals as needed. Rationalize all denominators.)

B. The answer is undefined.

12. Find the exact value of the quadrantal angle.

$$\textbf{csc}\ \frac{5\pi}{2}$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

A. $\textbf{csc}\ \frac{5\pi}{2} =$ 1

B. The value is undefined.

13. Find the exact value. Do not use a calculator.

cos (-11π)

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

A. **cos** $(-11\pi) =$ -1
(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

B. The answer is undefined.

14. Find the exact value of the following expression.

$$\textbf{cos}\left(\frac{\pi}{2}\right)$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

A. $\textbf{cos}\left(\frac{\pi}{2}\right) =$ 0
(Type an exact answer, using radicals as needed.)

B. The answer is undefined.

15. Name the quadrant in which the angle θ lies.

cos $\theta < 0$, **sin** $\theta > 0$

The angle θ lies in which quadrant?

III
IV
II
I

16. Name the quadrant in which the angle θ lies.

cos $\theta < 0$, **cot** $\theta > 0$

The angle θ lies in which quadrant?

- II
- IV
- I
- III ✔

17. Let θ be an angle in standard position. Name the quadrant in which θ lies.

tan $\theta > 0$, **sec** $\theta > 0$

The angle θ lies in which quadrant?

- II
- IV
- I ✔
- III

18. Name the quadrant in which the angle θ lies.

cos $\theta < 0$, **cot** $\theta > 0$

The angle θ lies in which quadrant?

- I
- IV
- II
- III ✔

19. Name the quadrant in which the angle θ lies.

sec $\theta < 0$, **sin** $\theta < 0$

In which quadrant does the angle θ lie?

- III ✔
- I
- IV
- II

20. Find the value of y assuming that the point (12,y) is on the terminal side of θ in quadrant I and **cos** $\theta = \frac{12}{20}$.

The value of y is 16 . (Simplify your answer.)

21. A function value and a quadrant are given. Find the other five function values. Give exact answers.

cos $\theta = \frac{5}{13}$, Quadrant I

sin $\theta =$ $\frac{12}{13}$ **tan** $\theta =$ $\frac{12}{5}$

(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

csc $\theta =$ $\frac{13}{12}$ **sec** $\theta =$ $\frac{13}{5}$ **cot** $\theta =$ $\frac{5}{12}$

(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

22. A function value and a quadrant are given. Find the other five function values. Give exact answers.

cot $\theta = -5$, Quadrant II

sin $\theta = \frac{\sqrt{26}}{26}$ **cos** $\theta = \frac{-5\sqrt{26}}{26}$ **tan** $\theta = -\frac{1}{5}$

(Simplify your answer. Type an exact answer, using radicals as needed. Rationalize all denominators.)

csc $\theta = \sqrt{26}$ **sec** $\theta = \frac{\sqrt{26}}{-5}$

(Simplify your answer. Type an exact answer, using radicals as needed. Rationalize all denominators.)

23. Find the exact values of the remaining trigonometric functions of θ from the given information.

sin $\theta = \frac{4}{5}$, **tan** $\theta < 0$

cos $\theta = -\frac{3}{5}$

(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

tan $\theta = -\frac{4}{3}$

(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

cot $\theta = -\frac{3}{4}$

(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

sec $\theta = -\frac{5}{3}$

(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

csc $\theta = \frac{5}{4}$

(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

24. Find the exact value of each of the remaining trigonometric functions of θ.

sec $\theta = 9$, **csc** $\theta < 0$

sin $\theta = -\frac{4\sqrt{5}}{9}$

(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

cos $\theta = \frac{1}{9}$

(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

tan $\theta = -4\sqrt{5}$

(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

cot $\theta = -\frac{\sqrt{5}}{20}$

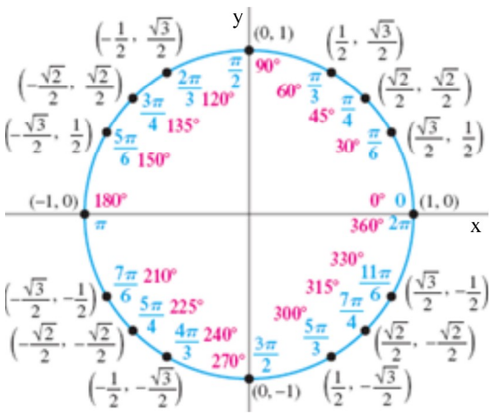
(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

csc $\theta = \frac{-9\sqrt{5}}{20}$

(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

25.

Use the figure shown below and the definition of the circular functions to find the exact values for **sin** s, **cos** s, and **tan** s for $s = \frac{\pi}{4}$.



Determine **sin** s.
Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

(Type an integer or a simplified fraction. Type an exact answer, using radicals as needed. Rationalize all denominators.)

A. **sin** s = $\frac{\sqrt{2}}{2}$

B. The value of **sin** s is undefined.

Determine **cos** s.
Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

(Type an integer or a simplified fraction. Type an exact answer, using radicals as needed. Rationalize all denominators.)

A. **cos** s = $\frac{\sqrt{2}}{2}$

B. The value of **cos** s is undefined.

Determine **tan** s.
Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

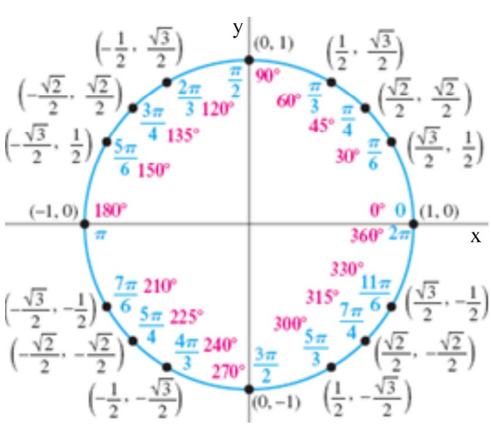
(Type an integer or a simplified fraction. Type an exact answer, using radicals as needed. Rationalize all denominators.)

A. **tan** s = 1

B. The value of **tan** s is undefined.

26.

Use the figure shown below and the definition of the circular functions to find the exact values for **sin** s, **cos** s, and **tan** s for $s = \frac{\pi}{4}$.



Determine **sin** s.
Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

(Type an integer or a simplified fraction. Type an exact answer, using radicals as needed. Rationalize all denominators.)

A. **sin** s = $\frac{\sqrt{2}}{2}$

B. The value of **sin** s is undefined.

Determine **cos** s.
Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

(Type an integer or a simplified fraction. Type an exact answer, using radicals as needed. Rationalize all denominators.)

A. **cos** s = $\frac{\sqrt{2}}{2}$

B. The value of **cos** s is undefined.

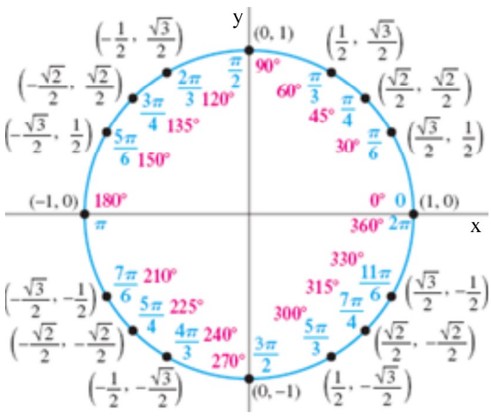
Determine **tan** s.
Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

(Type an integer or a simplified fraction. Type an exact answer, using radicals as needed. Rationalize all denominators.)

A. **tan** s = 1

B. The value of **tan** s is undefined.

27. Use the figure shown below and the definition of the circular functions to find the exact values for **sin** s, **cos** s, and **tan** s for $s = \frac{\pi}{3}$.



Determine **sin** s.
Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

(Type an integer or a simplified fraction. Type an exact answer, using radicals as needed. Rationalize all denominators.)

A. **sin** s = $\frac{\sqrt{3}}{2}$

B. The value of **sin** s is undefined.

Determine **cos** s.
Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

(Type an integer or a simplified fraction. Type an exact answer, using radicals as needed. Rationalize all denominators.)

A. **cos** s = $\frac{1}{2}$

B. The value of **cos** s is undefined.

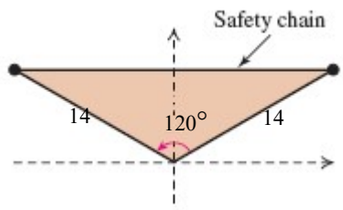
Determine **tan** s.
Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

(Type an integer or a simplified fraction. Type an exact answer, using radicals as needed. Rationalize all denominators.)

A. **tan** s = $\sqrt{3}$

B. The value of **tan** s is undefined.

28. A piece of heavy equipment has two 14-foot metal arms that make a V with the horizontal plane and form an angle of 120° at their base. A contractor wants to put a chain from the top of one arm to the top of the other arm for safety. How long must the chain be?



The length of the safety chain should be $14\sqrt{3}$ ft long.
(Type an exact answer, using radicals as needed.)

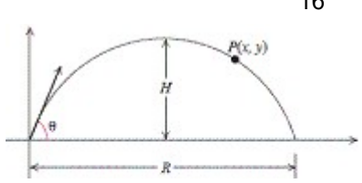
29. The equation of motion is given by the following.

$$y = x \tan\theta - \frac{16 \sec^2\theta}{v_0^2} x^2$$

Maximum height $H = \frac{1}{64}(v_0 \sin\theta)^2$

Time of flight $t = \frac{v_0 \sin\theta}{16}$

Horizontal range $R = \frac{v_0^2 \sin\theta \cos\theta}{16}$



A golf ball is hit with an initial velocity of 50 ft/sec with an angle $\theta = 30°$. Find H, t, and R.

H = 10 feet
(Round to the nearest integer as needed.)

t = 2 second(s)
(Round to the nearest integer as needed.)

R = 68 feet
(Round to the nearest integer as needed.)

30. A kite is flying at the end of 160 feet of string that is in a taut straight line. The height, h, of the kite is given by $h = 160 \sin\theta$, where θ is the angle the string makes with the ground. Find the kite's height assuming the following.
a. $\theta = 30^\circ$
b. $\theta = 60^\circ$

a. Assuming the angle $\theta = 30^\circ$, the kite's height is 80 ft.
(Simplify your answer. Type an integer or decimal rounded to the nearest tenth as needed.)

b. Assuming the angle $\theta = 60^\circ$, the kite's height is 138.6 ft.
(Simplify your answer. Type an integer or decimal rounded to the nearest tenth as needed.)

31. The depth of water, d feet, in a channel t hours after midnight is $d = 5\cos\left(\frac{\pi}{5}t\right) + 9$. Find the channel depth at

(a) 3 P.M. (low tide). **(b)** 10 A.M. (high tide).

(a) The channel depth at 3 P.M. is 4 feet.
(Simplify your answer.)

(b) The channel depth at 10 A.M. is 14 feet.
(Simplify your answer.)

32. Use the rules given below to find $\sin 225^\circ$, $\cos 225^\circ$, and $\tan 225^\circ$.

$\sin(180^\circ - \theta) = \sin\theta$, $\cos(180^\circ - \theta) = -\cos\theta$, and $\tan(180^\circ - \theta) = -\tan\theta$
$\sin(180^\circ + \theta) = -\sin\theta$, $\cos(180^\circ + \theta) = -\cos\theta$, and $\tan(180^\circ + \theta) = \tan\theta$

$\sin 225^\circ = -\frac{\sqrt{2}}{2}$
(Type an exact answer, using radicals as needed. Rationalize the denominator.)

$\cos 225^\circ = -\frac{\sqrt{2}}{2}$
(Type an exact answer, using radicals as needed. Rationalize the denominator.)

$\tan 225^\circ = 1$
(Type an exact answer, using radicals as needed. Rationalize the denominator.)

33. Watch the video and then solve the problem given below.

Click here to watch the video.[1]

Suppose that θ is an angle whose terminal side contains the point P(3, − 2). Find the exact value of $\cos\theta$.

$\cos\theta = \frac{3\sqrt{13}}{13}$

1: http://mediaplayer.pearsoncmg.com/assets/DJPsRAm8vxwZsISg_K2yMmtux3GXU467?clip=2

34. Watch the video and then solve the problem given below.

Click here to watch the video.[2]

If $\sin\theta > 0$ and $\tan\theta < 0$, in which quadrant does θ lie?

Choose the correct answer below.

- Quadrant IV
- ✔ Quadrant II
- Quadrant III
- Quadrant I

2: http://mediaplayer.pearsoncmg.com/assets/DJPsRAm8vxwZsISg_K2yMmtux3GXU467?clip=4

35. Watch the video and then solve the problem given below.

Click here to watch the video.[3]

Given that **cos** $\theta = \frac{2}{5}$ and **tan** $\theta < 0$, find the exact value of **csc** θ.

csc $\theta =$ $\frac{-5\sqrt{21}}{21}$

3: http://mediaplayer.pearsoncmg.com/assets/DJPsRAm8vxwZsISg_K2yMmtux3GXU467?clip=5

36. Watch the video and then solve the problem given below.

Click here to watch the video.[4]

Find the exact value of the expression **cos** 210°.

cos $210^\circ =$ $-\frac{\sqrt{3}}{2}$

4: http://mediaplayer.pearsoncmg.com/assets/DJPsRAm8vxwZsISg_K2yMmtux3GXU467?clip=8