Student: _____ **Date:** _____	**Instructor:** Vinh Dang **Course:** Trigonometry-Math 1316-Section 1105-M/W at 9:30am-Spr2020	**Assignment:** Final Exam

1. Complete the statement.

$y = \cos^{-1} x$ means that $x =$ _____, for $0 \le y \le \pi$.

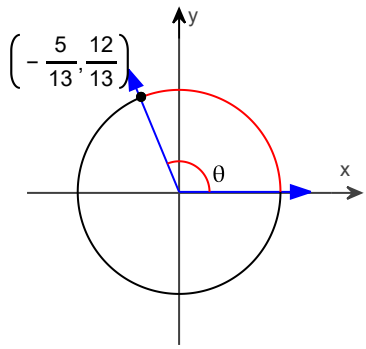
$y = \cos^{-1} x$ means that $x =$ _____, for $0 \le y \le \pi$.

2. Find one solution for the equation. Assume that all angles involved are acute angles.

$\sin(2\theta - 15^\circ) = \cos(3\theta - 20^\circ)$

$\theta =$ _____ °
(Simplify your answer.)

3. The figure shows an angle θ in standard position with its terminal side intersecting the unit circle. Evaluate the six circular function values of θ.



$\sin\theta =$ _____
(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

$\cos\theta =$ _____
(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

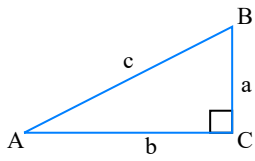
$\tan\theta =$ _____
(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

$\sec\theta =$ _____
(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

$\csc\theta =$ _____
(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

$\cot\theta =$ _____
(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

4. Suppose ABC is a right triangle with sides a, b, and c and right angle at C. Use the Pythagorean theorem to find the unknown side length. Then find the values of the six trigonometric functions for angle B. Rationalize the denominators when applicable.



a = 8, b = 15

What is the length of side c?

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

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

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

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

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

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

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

5. Select the correct choice below that matches the given expression with an expression that forms an identity.

cos (x − y) = (1) _____

(1)
- ○ **tan** x
- ○ **cos** x **cos** y − **sin** x **sin** y
- ○ − **sin** x
- ○ − **cos** x
- ○ **cot** x
- ○ **cos** x **cos** y + **sin** x **sin** y
- ○ **cos** x
- ○ **sin** x

6. Verify that the equation is an identity.

$$\frac{-1+\sec^2\alpha}{\tan\alpha}=\tan\alpha$$

To verify the identity, start with the more complicated side and transform it to look like the other side. Choose the correct transformations and transform the expression at each step.

$$\frac{-1+\sec^2\alpha}{\tan\alpha}=\frac{\qquad\qquad}{\tan\alpha}$$ (1) _____

$$=\tan\alpha$$ (2) _____

(1)
- ○ Apply an even-odd identity.
- ○ Apply a Pythagorean identity.
- ○ Apply a quotient identity.

(2)
- ○ Apply a quotient identity.
- ○ Apply a Pythagorean identity.
- ○ Divide out the common factor.
- ○ Apply a reciprocal identity.

7. Convert the following degree measure to radian measure.

630°

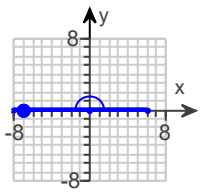
630° = _____ radians

(Simplify your answer. Type an exact answer, using π as needed. Use integers or fractions for any numbers in the expression.)

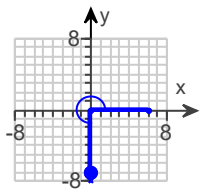
8. Sketch an angle θ in standard position such that θ has the least possible positive measure, and the point $(-7,0)$ is on the terminal side of θ. Then find the values of the six trigonometric functions for the angle. Rationalize denominators if applicable. Do not use a calculator.

Choose the correct graph below.

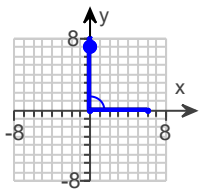
A.



B.



C.



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

A. **sin** $\theta =$ _____
(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, if necessary, fill in the answer box to complete your choice.

A. **cos** $\theta =$ _____
(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, if necessary, fill in the answer box to complete your choice.

A. **tan** $\theta =$ _____
(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, if necessary, fill in the answer box to complete your choice.

A. **csc** $\theta =$ _____
(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, if necessary, fill in the answer box to complete your choice.

A. **sec** $\theta =$ _____
(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, if necessary, fill in the answer box to complete your choice.

A. **cot** $\theta =$ _____

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

○ **B.** The function is undefined.

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9. The equation, with a restriction on x, is the terminal side of an angle θ in standard position.

$4x + y = 0,\ x \leq 0$

Give the exact values of the six trigonometric functions of θ.

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

○ **A.** **sin** θ = _____
(Simplify your answer. Use integers or fractions for any numbers in the expression. Type an exact answer, using radicals as needed. Rationalize all denominators.)

○ **B.** The function is undefined.

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

○ **A.** **cos** θ = _____
(Simplify your answer. Use integers or fractions for any numbers in the expression. Type an exact answer, using radicals as needed. Rationalize all denominators.)

○ **B.** The function is undefined.

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

○ **A.** **tan** θ = _____
(Simplify your answer. Use integers or fractions for any numbers in the expression. Type an exact answer, using radicals as needed. Rationalize all denominators.)

○ **B.** The function is undefined.

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

○ **A.** **csc** θ = _____
(Simplify your answer. Use integers or fractions for any numbers in the expression. Type an exact answer, using radicals as needed. Rationalize all denominators.)

○ **B.** The function is undefined.

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

○ **A.** **sec** θ = _____
(Simplify your answer. Use integers or fractions for any numbers in the expression. Type an exact answer, using radicals as needed. Rationalize all denominators.)

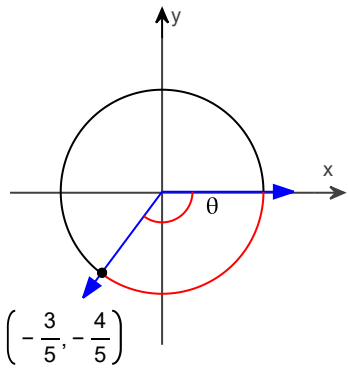
○ **B.** The function is undefined.

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

○ **A.** **cot** θ = _____
(Simplify your answer. Use integers or fractions for any numbers in the expression. Type an exact answer, using radicals as needed. Rationalize all denominators.)

○ **B.** The function is undefined.

10. The figure shows an angle θ in standard position with its terminal side intersecting the unit circle. Evaluate the six circular function values of θ.



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

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

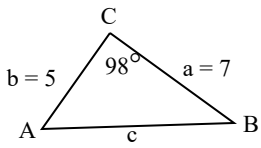
tan θ = _____
(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

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

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

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

11. Solve the triangle shown to the right. Round the lengths of sides to the nearest tenth and angles to the nearest degree.



c ≈ _____
(Do not round until the final answer. Then round to the nearest tenth as needed.)
A ≈ _____ °
(Round to the nearest degree as needed.)
B ≈ _____ °
(Round to the nearest degree as needed.)

12. Find the exact value of **cos** θ, given that **sin** $\theta = -\frac{4}{5}$ and θ is in quadrant III. Rationalize denominators when applicable.

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

- **A.** **cos** θ = _____ (Simplify your answer. Type an exact answer, using radicals as needed. Type an integer or a fraction.)
- **B.** The function is undefined.

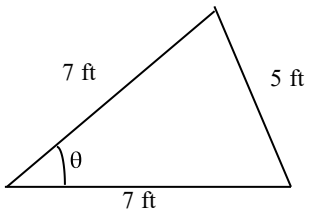
13. Find the exact value of the real number y if it exists. Do not use a calculator.

$y = \sec^{-1}(-1)$

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

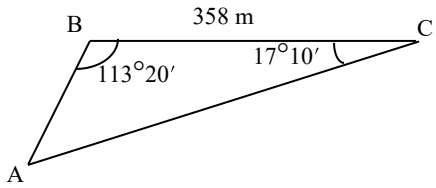
- **A.** $y = \sec^{-1}(-1) =$ _____
  (Simplify your answer. Type an exact answer, using π as needed. Use integers or fractions for any numbers in the expression.)
- **B.** $\sec^{-1}(-1)$ does not exist.

14. A triangular truss is shown in the figure. Find angle θ.



$\theta \approx$ _____ °
(Do not round until the final answer. Then round to the nearest degree as needed.)

15. To find the distance AB across a river, a surveyor laid off a distance BC = 358 m on one side of the river. It is found that B = 113°20′ and C = 17°10′. Find AB.



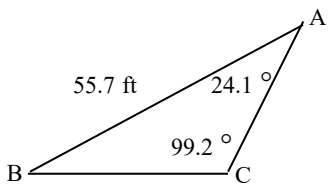
The distance AB across the river is _____ m
(Simplify your answer. Do not round until the final answer. Then round to the nearest whole number as needed.)

16. Use the appropriate reciprocal identity to find the exact value of **cot** θ for the given value of **tan** θ.

tan $\theta = 8$

cot $\theta =$ _____
(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

17. Determine the remaining sides and angles of the triangle ABC.



What is the measure of angle B?

_____ °

(Simplify your answer. Type an integer or a decimal.)

What is the length of side a?

_____ ft

(Simplify your answer. Type an integer or a decimal. Round to the nearest tenth as needed.)

What is the length of side b?

_____ ft

(Simplify your answer. Type an integer or a decimal. Round to the nearest tenth as needed.)

18. Determine the amplitude, period, any vertical translation, and any phase shift of the given graph.

$y = 3\cos\left(x + \frac{\pi}{6}\right)$

The amplitude is _____.

The period is _____. (Type an exact answer, using π as needed.)

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

- **A.** The vertical translation is _____ units.
- **B.** There is no vertical translation.

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

- **A.** The phase shift is _____ units to the left.
  (Type an exact answer, using π as needed.)
- **B.** There is no phase shift.

19. Find the exact values of the six trigonometric functions of the angle.

510°

$\sin 510^\circ =$ _____

$\cos 510^\circ =$ _____

$\tan 510^\circ =$ _____

(Simplify your answers. Type exact answers, using radicals as needed. Use integers or fractions for any numbers in the expression. Rationalize any denominators.)

$\csc 510^\circ =$ _____

$\sec 510^\circ =$ _____

$\cot 510^\circ =$ _____

(Simplify your answers. Type exact answers, using radicals as needed. Use integers or fractions for any numbers in the expression. Rationalize any denominators.)

20. Find the remaining five trigonometic functions of θ.

$\sin\theta = \frac{2}{3}$, θ in quadrant II

Complete the following table.

$\sin\theta = \frac{2}{3}$	$\csc\theta =$ _____
$\cos\theta =$ _____	$\sec\theta =$ _____
$\tan\theta =$ _____	$\cot\theta =$ _____

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

1. **cos** y

---

2. 25

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3. $\frac{12}{13}$

   $-\frac{5}{13}$

   $-\frac{12}{5}$

   $-\frac{13}{5}$

   $\frac{13}{12}$

   $-\frac{5}{12}$

---

4. 17

   $\frac{15}{17}$

   $\frac{8}{17}$

   $\frac{15}{8}$

   $\frac{17}{8}$

   $\frac{17}{15}$

   $\frac{8}{15}$

---

5. (1) **cos** x **cos** y + **sin** x **sin** y

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6. **tan** $^2\alpha$

   (1) Apply a Pythagorean identity.

   (2) Divide out the common factor.

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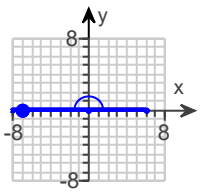
7. $\frac{7\pi}{2}$



8. A.

A. **sin** θ = **0**
(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

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

A. **tan** θ = **0**
(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

B. The function is undefined.

A. **sec** θ = **− 1**
(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

B. The function is undefined.

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9. A. **sin** θ = $\frac{4\sqrt{17}}{17}$
(Simplify your answer. Use integers or fractions for any numbers in the expression. Type an exact answer, using radicals as needed. Rationalize all denominators.)

A. **cos** θ = $-\frac{\sqrt{17}}{17}$
(Simplify your answer. Use integers or fractions for any numbers in the expression. Type an exact answer, using radicals as needed. Rationalize all denominators.)

A. **tan** θ = **− 4**
(Simplify your answer. Use integers or fractions for any numbers in the expression. Type an exact answer, using radicals as needed. Rationalize all denominators.)

A. **csc** θ = $\frac{\sqrt{17}}{4}$
(Simplify your answer. Use integers or fractions for any numbers in the expression. Type an exact answer, using radicals as needed. Rationalize all denominators.)

A. **sec** θ = $-\sqrt{17}$
(Simplify your answer. Use integers or fractions for any numbers in the expression. Type an exact answer, using radicals as needed. Rationalize all denominators.)

A. **cot** θ = $-\frac{1}{4}$
(Simplify your answer. Use integers or fractions for any numbers in the expression. Type an exact answer, using radicals as needed. Rationalize all denominators.)

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10. $-\frac{4}{5}$

    $-\frac{3}{5}$

    $\frac{4}{3}$

    $-\frac{5}{3}$

    $-\frac{5}{4}$

    $\frac{3}{4}$

---

11. 9.2

    49

    33

---

12. A.

    cos $\theta =$ $-\frac{3}{5}$ (Simplify your answer. Type an exact answer, using radicals as needed. Type an integer or a fraction.)

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13. A. $y =$ **sec** $^{-1}(-1) =$ π
    (Simplify your answer. Type an exact answer, using π as needed. Use integers or fractions for any numbers in the expression.)

---

14. 42

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15. 139

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16. $\frac{1}{8}$

---

17. 56.7

    23

    47.2

---

18. 3

2π

B. There is no vertical translation.

A. The phase shift is $\frac{\pi}{6}$ units to the left.(Type an exact answer, using π as needed.)

---

19. $\frac{1}{2}$

$-\frac{\sqrt{3}}{2}$

$-\frac{\sqrt{3}}{3}$

2

$\frac{-2\sqrt{3}}{3}$

$-\sqrt{3}$

---

20. $\frac{3}{2}$

$-\frac{\sqrt{5}}{3}$

$-\frac{3\sqrt{5}}{5}$

$-\frac{2\sqrt{5}}{5}$

$-\frac{\sqrt{5}}{2}$
