

Student: _____
Date: _____
Time: _____

Instructor: John Blackburn
Course: Math 1113 Fall 2010
Book: Sullivan: Precalculus, 8e

Assignment: Test 2

1. Convert the angle to a decimal in degrees.

$$60^{\circ}33'46''$$

$$60^{\circ}33'46'' = \square^{\circ}$$

(Do not round until the final answer. Then round to two decimal places as needed.)

Answer: 60.56

2. Convert the angle to D°M'S" form.

$$44.32^{\circ}$$

$$44.32^{\circ} = \square^{\circ}\square'\square''$$

Answers 44

19

12

3. Convert the angle in degrees to radians.

$$195^{\circ}$$

$$195^{\circ} = \square \text{ radian(s)}$$

(Simplify your answer. Type an exact answer in terms of π .)

Answer: $\frac{13\pi}{12}$

4. Convert the angle in radians to degrees.

$$\frac{7\pi}{18}$$

$$\frac{7\pi}{18} = \square^{\circ} \text{ (Simplify your answer.)}$$

Answer: 70

5. Convert the angle in degrees to radians.

$$138^{\circ}$$

$$138^{\circ} = \square \text{ radian(s)}$$

(Type an integer or decimal rounded to two decimal places as needed.)

Answer: 2.41

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6. Convert the angle in radians to degrees.

4.98

$$4.98 \text{ radians} = \boxed{}^\circ$$

(Type an integer or decimal rounded to two decimal places as needed.)

Answer: 285.33

7. Find the length s of the arc of a circle of radius 50 feet subtended by the central angle $\frac{1}{10}$ radian.

$$s \text{ (arc length)} = \boxed{} \text{ feet}$$

Answer: 5

8. Find the central angle θ which subtends an arc of length 4 meters of a circle of radius 15 meters.

$$\theta \approx \boxed{} \text{ radians (Round to six decimal places as needed.)}$$

Convert to degrees.

$$\theta \approx \boxed{} \text{ degrees (Round to three decimal places as needed.)}$$

Answers 0.266667

15.279

9. Find the length s of the arc of a circle of radius 30 meters subtended by the central angle 54° .

$$s \text{ (arc length)} = \boxed{} \text{ meters}$$

(Type an integer or decimal rounded to three decimal places as needed.)

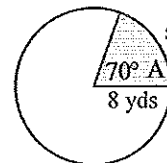
Answer: 28.274

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10. Find the length s and area A .



The length of the arc is yards.

(Type an integer or decimal rounded to three decimal places as needed.)

The area A of the sector is square yards.

(Type an integer or decimal rounded to three decimal places as needed.)

Answers 9.774

39.095

11. An object is traveling around a circle with a radius of 12 meters. If in 30 seconds a central angle of $\frac{1}{6}$ radian is swept out, what are the linear and angular speeds of the object?

What is the linear speed of the object?

$v =$ meters / sec

(Type an integer or a simplified fraction.)

What is the angular speed of the object?

$\omega =$ radian / sec

(Type an integer or a simplified fraction.)

Answers $\frac{1}{15}$

$\frac{1}{180}$

12. City A is due north of City B. Find the distance between City A ($48^\circ 7'$ north latitude) and City B ($21^\circ 49'$ north latitude). Assume that the radius of Earth is 3960 miles.

The distance between City A and City B is miles.

(Round to the nearest mile as needed.)

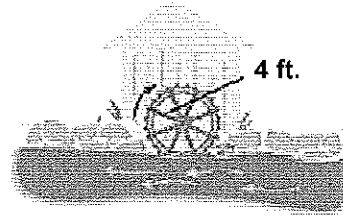
Answer: 1818

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13. To approximate the speed of the current of a river, a circular paddle wheel with radius 4 ft. is lowered into the water. If the current causes the wheel to rotate at a speed of 16 revolutions per minute, what is the speed of the current?



The speed of the current is $\frac{\text{miles}}{\text{hour}}$.

(Type an integer or decimal rounded to two decimal places as needed.)

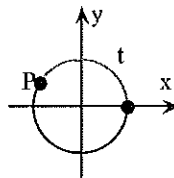
Answer: 4.57

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14. Find the values of $\sin t$, $\cos t$, $\tan t$, $\csc t$, $\sec t$, and $\cot t$ if $P = \left(-\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$ is the point on the unit circle that corresponds to the real number t .



$$\sin t = \square$$

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

$$\cos t = \square$$

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

$$\tan t = \square$$

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

$$\csc t = \square$$

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

$$\sec t = \square$$

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

$$\cot t = \square$$

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

Answers $\frac{1}{2}$

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

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

$$2$$

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

$$-\sqrt{3}$$

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15.

The variable t is a real number and $P = \left(\frac{2\sqrt{6}}{5}, -\frac{1}{5} \right)$ is the point on the unit circle that corresponds to t . Find the exact values of the six trigonometric functions of t .

$$\sin t = \square$$

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

$$\cos t = \square$$

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

$$\tan t = \square$$

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

$$\csc t = \square$$

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

$$\sec t = \square$$

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

$$\cot t = \square$$

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

Answers

$$-\frac{1}{5}$$
$$\frac{2\sqrt{6}}{5}$$
$$-\frac{\sqrt{6}}{12}$$
$$-5$$
$$\frac{5\sqrt{6}}{12}$$
$$-2\sqrt{6}$$

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16. Find the exact value of the expression. Do not use a calculator.

$$\cos 30^\circ + \sin 45^\circ$$

$$\cos 30^\circ + \sin 45^\circ = \square$$

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

Answer: $\frac{\sqrt{3} + \sqrt{2}}{2}$

17. Find the exact value of the expression. Do not use a calculator.

$$\csc 30^\circ \cot 45^\circ$$

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

A. $\csc 30^\circ \cot 45^\circ = \square$

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

B. The answer is undefined.

Answer: A, 2

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18. Find the exact values of the six trigonometric functions of the given angle. Do not use a calculator.

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

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

A. $\sin\left(-\frac{2\pi}{3}\right) = \blacksquare$

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

- B. The function value is undefined.

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

A. $\cos\left(-\frac{2\pi}{3}\right) = \blacksquare$

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

- B. The function value is undefined.

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

A. $\tan\left(-\frac{2\pi}{3}\right) = \blacksquare$

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

- B. The function value is undefined.

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

A. $\csc\left(-\frac{2\pi}{3}\right) = \blacksquare$

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

- B. The function value is undefined.

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

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18.
(cont.)

A. $\sec\left(-\frac{2\pi}{3}\right) = \blacksquare$

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

B. The function value is undefined.

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

A. $\cot\left(-\frac{2\pi}{3}\right) = \blacksquare$

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

B. The function value is undefined.

Answers A, $-\frac{\sqrt{3}}{2}$

A, $-\frac{1}{2}$

A, $\sqrt{3}$

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

A, -2

A, $\frac{\sqrt{3}}{3}$

19. Use a calculator to find the approximate value of the expression. Round the answer to two decimal places.

$$\sec \frac{5\pi}{14}$$

$$\sec \frac{5\pi}{14} = \square \text{ (Round to two decimal places as needed.)}$$

Answer: 2.30

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20. The point given below is on the terminal side of an angle θ . Find the exact values of the six trigonometric functions of θ .

$(24, -7)$

$\sin \theta = \square$ (Type a simplified fraction.)

$\cos \theta = \square$ (Type a simplified fraction.)

$\tan \theta = \square$ (Type a simplified fraction.)

$\cot \theta = \square$ (Type a simplified fraction.)

$\sec \theta = \square$ (Type a simplified fraction.)

$\csc \theta = \square$ (Type a simplified fraction.)

Answers $-\frac{7}{25}$

$\frac{24}{25}$

$-\frac{7}{24}$

$-\frac{24}{7}$

$\frac{25}{24}$

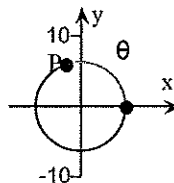
$-\frac{25}{7}$

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21. The point $P = (-2, 6)$ on the circle $x^2 + y^2 = r^2$ is also on the terminal side of an angle θ in standard position. Find $\sin \theta$, $\cos \theta$, $\tan \theta$, $\csc \theta$, $\sec \theta$, and $\cot \theta$.



$$\sin \theta = \square$$

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

$$\cos \theta = \square$$

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

$$\tan \theta = \square$$

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

$$\csc \theta = \square$$

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

$$\sec \theta = \square$$

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

$$\cot \theta = \square$$

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

Answers

$$\frac{3\sqrt{10}}{10}$$
$$-\frac{\sqrt{10}}{10}$$
$$-3$$
$$\frac{\sqrt{10}}{3}$$
$$-\sqrt{10}$$

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21.
(cont.) $-\frac{1}{3}$

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

$$\cos \theta < 0, \tan \theta > 0$$

In which quadrant does the angle θ lie?

- I
 II
 IV
 III

Answer: the fourth choice

23. $\sin \theta$ and $\cos \theta$ are given. Find the exact value of each of the four remaining trigonometric functions.

$$\sin \theta = -\frac{24}{25}, \cos \theta = \frac{7}{25}$$

$\csc \theta = \square$ (Type an integer or a fraction.)

$\sec \theta = \square$ (Type an integer or a fraction.)

$\tan \theta = \square$ (Type an integer or a fraction.)

$\cot \theta = \square$ (Type an integer or a fraction.)

Answers $-\frac{25}{24}$

$$\frac{25}{7}$$

$$-\frac{24}{7}$$

$$-\frac{7}{24}$$

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

$$\sin \theta = \frac{3}{5}, \theta \text{ in quadrant II}$$

$$\cos \theta = \square$$

(Type a simplified fraction. Rationalize the denominator if necessary.)

$$\tan \theta = \square$$

(Type a simplified fraction. Rationalize the denominator if necessary.)

$$\cot \theta = \square$$

(Type a simplified fraction. Rationalize the denominator if necessary.)

$$\sec \theta = \square$$

(Type a simplified fraction. Rationalize the denominator if necessary.)

$$\csc \theta = \square$$

(Type a simplified fraction. Rationalize the denominator if necessary.)

Answers $-\frac{4}{5}$

$$-\frac{3}{4}$$

$$-\frac{4}{3}$$

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

$$\frac{5}{3}$$

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

$$\cos \theta = -\frac{7}{25}, \theta \text{ in quadrant III}$$

$$\sin \theta = \square$$

(Type a simplified fraction. Rationalize the denominator if necessary.)

$$\tan \theta = \square$$

(Type a simplified fraction. Rationalize the denominator if necessary.)

$$\cot \theta = \square$$

(Type a simplified fraction. Rationalize the denominator if necessary.)

$$\sec \theta = \square$$

(Type a simplified fraction. Rationalize the denominator if necessary.)

$$\csc \theta = \square$$

(Type a simplified fraction. Rationalize the denominator if necessary.)

Answers $-\frac{24}{25}$

$$\frac{24}{7}$$

$$\frac{7}{24}$$

$$-\frac{25}{7}$$

$$-\frac{25}{24}$$

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26. Find the exact value of the remaining trigonometric functions of θ .

$$\cot \theta = \frac{3}{4}, \cos \theta < 0$$

$$\tan \theta = \square$$

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

$$\sin \theta = \square$$

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

$$\cos \theta = \square$$

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

$$\csc \theta = \square$$

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

$$\sec \theta = \square$$

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

Answers $\frac{4}{3}$

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

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

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

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

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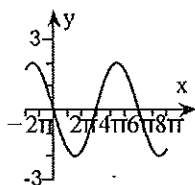
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27. Match the given function to one of the graphs.

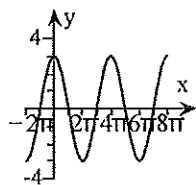
$$y = 3 \sin\left(\frac{1}{2}x\right)$$

Select the correct graph.

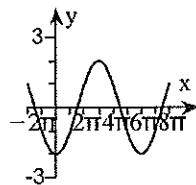
A.



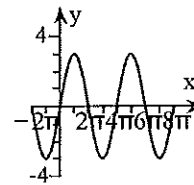
B.



C.



D.



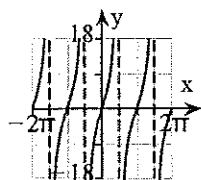
Answer: D

28. Graph the following function.

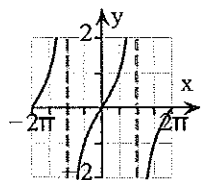
$$y = 9 \tan x$$

Choose the correct graph below.

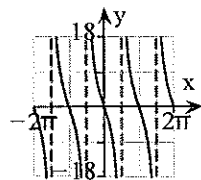
A.



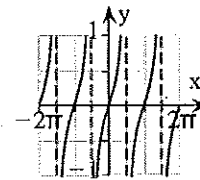
B.



C.



D.



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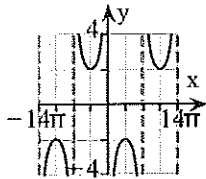
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29. Graph the following function.

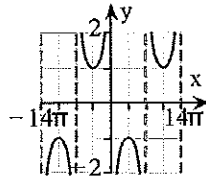
$$y = -2 \csc\left(\frac{1}{7}x\right)$$

Choose the correct graph below.

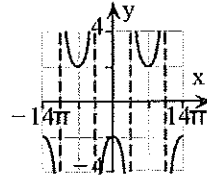
A.



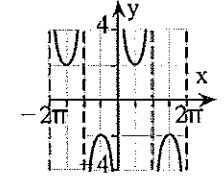
B.



C.



D.



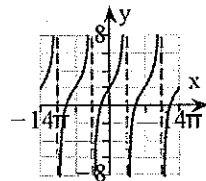
Answer: A

30. Graph the following function.

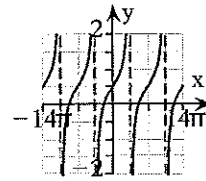
$$y = \tan\left(\frac{1}{7}x\right) + 2$$

Choose the correct graph below.

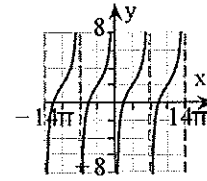
A.



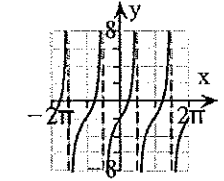
B.



C.



D.



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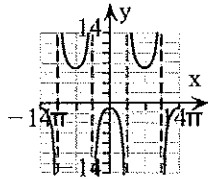
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31. Graph the following function.

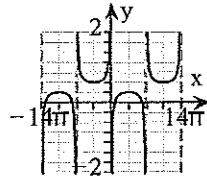
$$y = -4 \csc\left(\frac{1}{7}x\right) + 3$$

Choose the correct graph below.

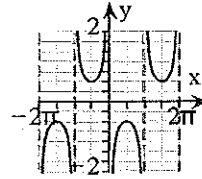
A.



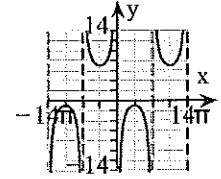
B.



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D.



Answer: D

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32. Find the amplitude, period, and phase shift of the function. Graph the function. Be sure to label key points. Show at least two periods.

$$y = 2 \sin (3x - \pi)$$

What is the amplitude?

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

What is the period?

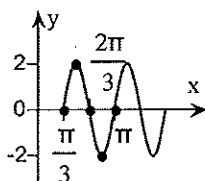
(Simplify your answer. Type an exact answer, using π as needed. Use integers or fractions for any numbers in the expression.)

What is the phase shift?

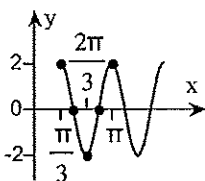
(Simplify your answer. Type an exact answer, using π as needed. Use integers or fractions for any numbers in the expression.)

Choose the correct graph below.

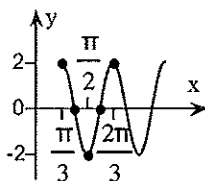
A.



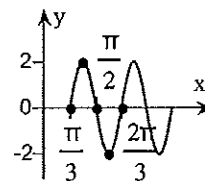
B.



C.



D.



Answers 2

$$\frac{2\pi}{3}$$

$$\frac{\pi}{3}$$

A

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33. Find the amplitude, period, and phase shift of the function. Graph the function. Be sure to label key points. Show at least two periods.

$$y = 4 \cos\left(6x + \frac{\pi}{2}\right)$$

What is the amplitude?

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

What is the period?

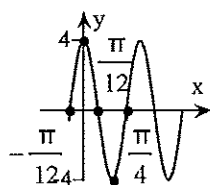
(Simplify your answer. Type an exact answer, using π as needed. Use integers or fractions for any numbers in the expression.)

What is the phase shift?

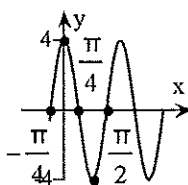
(Simplify your answer. Type an exact answer, using π as needed. Use integers or fractions for any numbers in the expression.)

Choose the correct graph below.

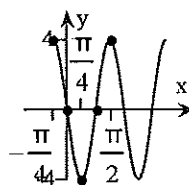
A.



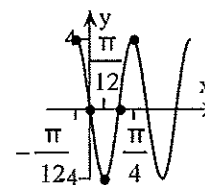
B.



C.



D.



Answers 4

$$\frac{\pi}{3}$$

$$-\frac{\pi}{12}$$

D

Student: _____
Date: _____
Time: _____

Instructor: John Blackburn
Course: Math 1113 Fall 2010
Book: Sullivan: Precalculus, 8e

Assignment: Test 2

34. Find the amplitude, period, and phase shift of the function. Graph the function. Be sure to label key points. Show at least two periods.

$$y = -5 \sin\left(6x + \frac{\pi}{2}\right)$$

What is the amplitude?

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

What is the period?

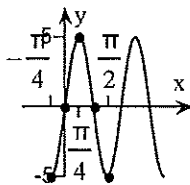
(Simplify your answer. Type an exact answer, using π as needed. Use integers or fractions for any numbers in the expression.)

What is the phase shift?

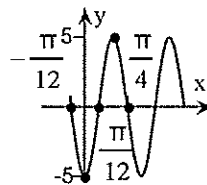
(Simplify your answer. Type an exact answer, using π as needed. Use integers or fractions for any numbers in the expression.)

Choose the correct graph below.

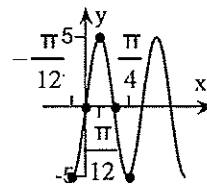
A.



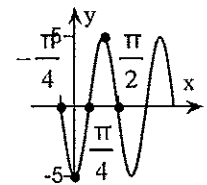
B.



C.



D.



Answers 5

$$\frac{\pi}{3}$$

$$-\frac{\pi}{12}$$

B

Student: _____
Date: _____
Time: _____

Instructor: John Blackburn
Course: Math 1113 Fall 2010
Book: Sullivan: Precalculus, 8e

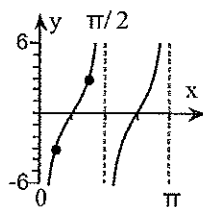
Assignment: Test 2

35. Graph the function. Be sure to label key points and show at least two periods.

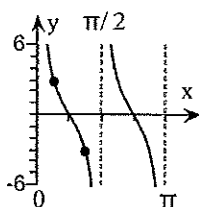
$$y = 3 \tan (2x - \pi)$$

Choose the correct graph of $y = 3 \tan (2x - \pi)$.

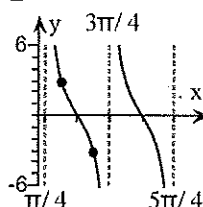
A.



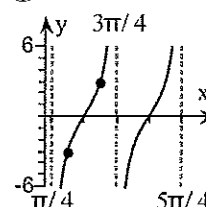
B.



C.



D.



Answer: D