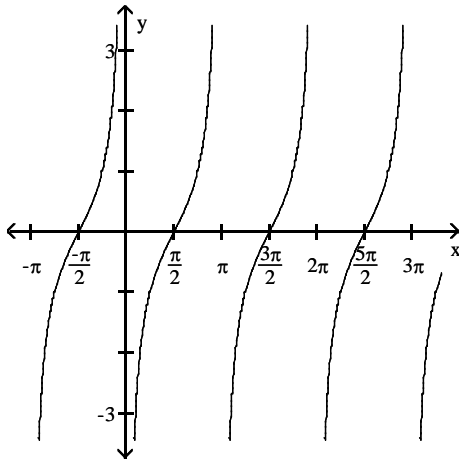Name_____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Match the function to its graph.

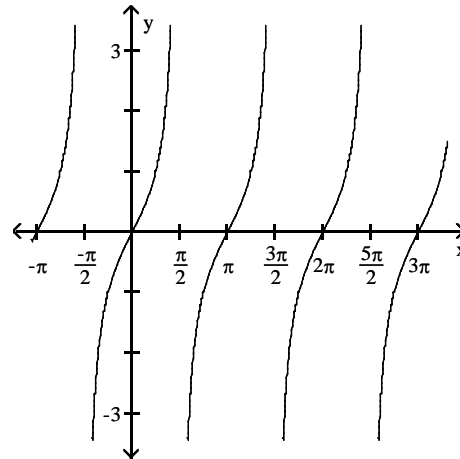1) $y = \tan\left(x - \dfrac{\pi}{2}\right)$ 1) _____
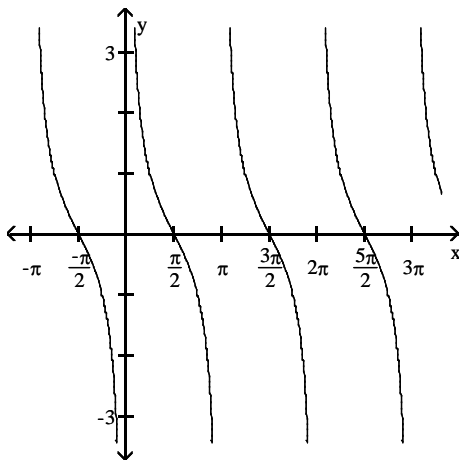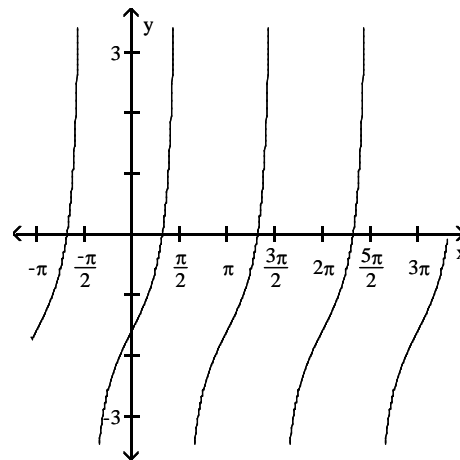
A)

B)

C)

D)

Solve the problem.

2) Island A is 150 miles from island B. A ship captain travels 250 miles from island A and then finds   2) _____
that he is off course and 160 miles from island B. What angle, in degrees, must he turn through to
head straight for island B? Round the answer to two decimal places. (Hint: Be careful to properly
identify which angle is the turning angle.)
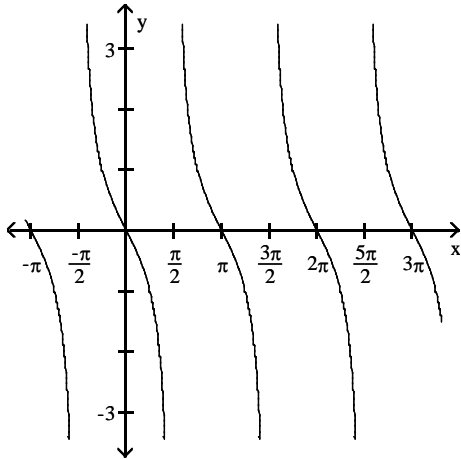   A) 145.08°   B) 55.08°   C) 110.17°   D) 34.92°

Match the function to its graph.
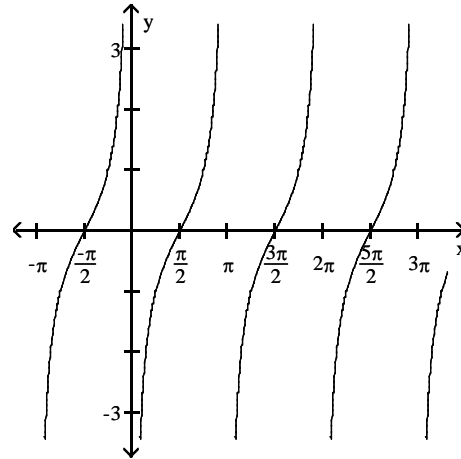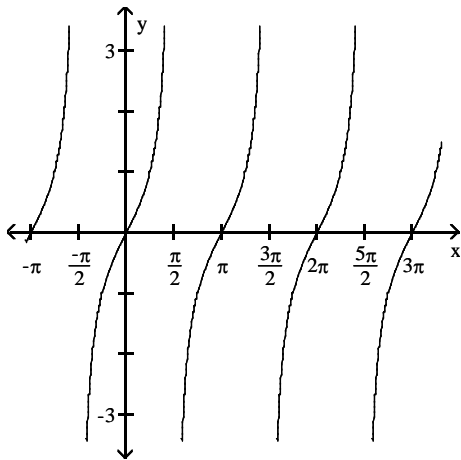
3) $y = -\tan x$

3) _____

A)

B)

C)

D)
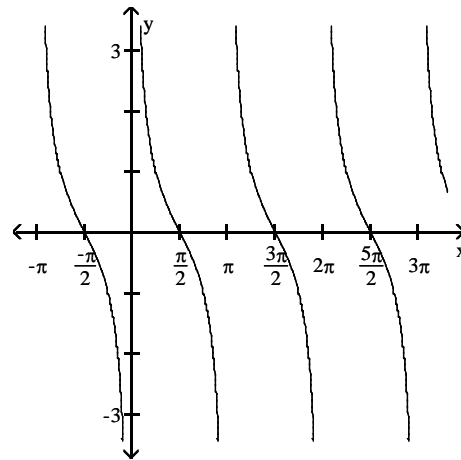
Two sides and an angle are given. Determine whether the given information results in one triangle, two triangles, or no triangle at all. Solve any triangle(s) that results.

4) $b = 5$, $c = 6$, $\beta = 65°$

4) _____

A) one triangle
$\beta = 33°, \alpha = 82°, a = 11$

B) one triangle
$\gamma = 34°, \alpha = 81°, a = 15$

C) one triangle
$\gamma = 32°, \alpha = 83°, a = 13$

D) no triangle

Without graphing the function, determine its amplitude or period as requested.

5) $y = \dfrac{7}{4} \cos \left(- \dfrac{8\pi}{5}x\right)$ Find the period.

5) _____

A) $\dfrac{16\pi}{5}$

B) $\dfrac{5}{4}$

C) $\dfrac{7\pi}{2}$

D) $\dfrac{2}{7}$

2

Solve the problem.

6) For what numbers θ is f(θ) = cot θ not defined?   6) _____

    A) integral multiples of π (180°)   B) odd multiples of π (180°)
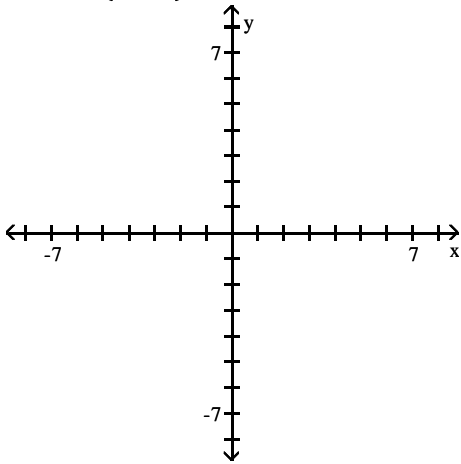
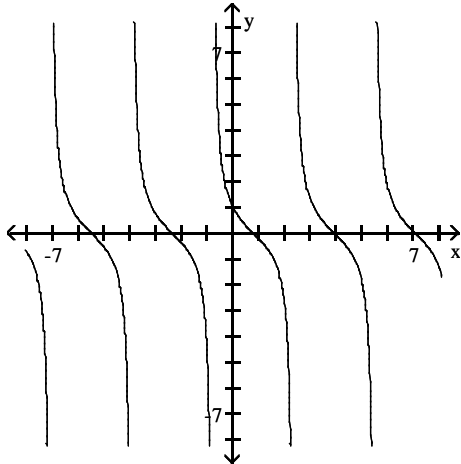   C) odd multiples of $\frac{\pi}{2}$ (90°)   D) all real numbers

Graph the function.
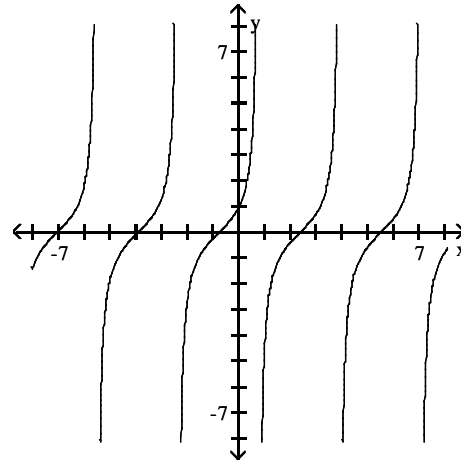
7) $y = -\cot\left(x - \frac{\pi}{4}\right)$ 7) _____
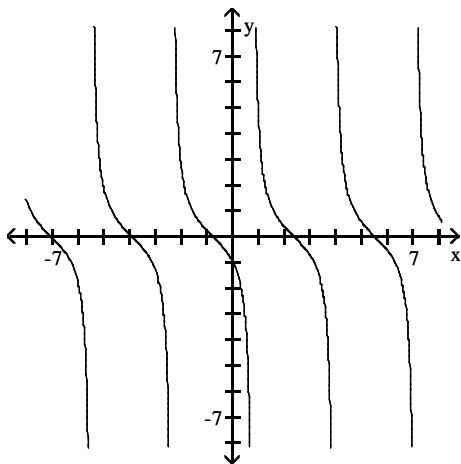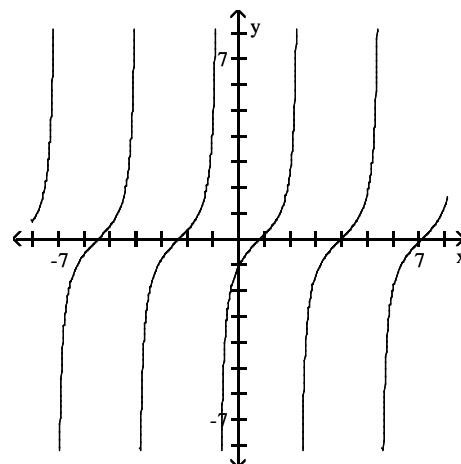

A)

B)

C)

D)

3

Convert the angle in degrees to radians. Express the answer as multiple of π.

8) 87°

8) _____

A) $\dfrac{29\pi}{90}$
B) $\dfrac{29\pi}{30}$
C) $\dfrac{29\pi}{120}$
D) $\dfrac{29\pi}{60}$

Solve the problem.

9) The minute hand of a clock is 8 inches long. How far does the tip of the minute hand move in 15 minutes? If necessary, round the answer to two decimal places.

9) _____

A) 12.57 in.
B) 10.83 in.
C) 15.08 in.
D) 13.8 in.

Name the quadrant in which the angle θ lies.

10) $\sec \theta < 0$, $\quad \tan \theta < 0$

10) _____

A) I
B) II
C) III
D) IV

Convert the angle to D° M' S" form. Round the answer to the nearest second.

11) 198.87°

11) _____

A) 198°52'12"
B) 198°50'87"
C) 198°53'12"
D) 198°52'87"

Find the exact value. Do not use a calculator.

12) $\sin 0$

12) _____

A) $\dfrac{\sqrt{2}}{2}$
B) 1
C) 0
D) undefined

Solve the problem.

13) What is the y-intercept of $y = \cos x$?

13) _____

A) $\dfrac{\pi}{2}$
B) π
C) 1
D) 0

14) For what numbers x, $0 \le x \le 2\pi$, does $\cos x = 0$?

14) _____

A) $0, \pi, 2\pi$
B) $\dfrac{\pi}{2}, \dfrac{3\pi}{2}$
C) 0, 1
D) 0, 1, 2

Convert the angle in radians to degrees.

15) $\dfrac{12\pi}{5}$

15) _____

A) 434°
B) 433°
C) 432°
D) 431°

Find the exact value of the indicated trigonometric function of θ.

16) $\sin \theta = \dfrac{1}{2}$, $\quad \sec \theta < 0$ $\qquad$ Find $\cos \theta$ and $\tan \theta$.

16) _____

A) $\cos \theta = -\dfrac{\sqrt{3}}{2}$, $\tan \theta = -\dfrac{\sqrt{3}}{3}$

B) $\cos \theta = \sqrt{\dfrac{3}{2}}$, $\tan \theta = \dfrac{\sqrt{3}}{3}$

C) $\cos \theta = -\sqrt{3}$, $\tan \theta = -\dfrac{10\sqrt{3}}{3}$

D) $\cos \theta = -\dfrac{\sqrt{3}}{2}$, $\tan \theta = \dfrac{\sqrt{3}}{3}$

4

Find the exact value of the expression.

17) $\tan\left[\cos^{-1}\frac{1}{3}\right]$

    A) $-2\sqrt{3}$ B) $2\sqrt{3}$ C) $\frac{2\sqrt{2}}{3}$ D) $2\sqrt{2}$

17) _____

Solve the problem.

18) Find $\tan\frac{\theta}{2}$, given that $\tan\theta = 3$ and θ terminates in $\pi < \theta < 3\pi/2$.

    A) $\frac{\sqrt{10}-1}{-3}$ B) $\frac{\sqrt{10}+1}{-3}$ C) $\frac{\sqrt{10}+1}{3}$ D) $\frac{\sqrt{10}-1}{3}$

18) _____

Find the domain of the function f and of its inverse function f⁻¹.

19) $f(x) = 3\tan x + 5$

    A) Domain of f: $(-\infty, \infty)$

        Domain of f⁻¹: $x \neq \frac{(2k+1)\pi}{2}$; k an integer

    B) Domain of f: $x \neq \frac{(2k+1)\pi}{2}$; k an integer

        Domain of f⁻¹: $[2, 8]$

    C) Domain of f: $x \neq \frac{(2k+1)\pi}{2}$; k an integer

        Domain of f⁻¹: $(-\infty, \infty)$

    D) Domain of f: $(-\infty, \infty)$

        Domain of f⁻¹: $[2, 8]$

19) _____

Find the exact solution of the equation.

20) $-4\tan^{-1}x = \pi$

    A) x = 0   B) x = 1   C) $x = \frac{\pi}{4}$ D) x = -1

20) _____

Express the sum or difference as a product of sines and/or cosines.

21) $\sin(7\theta) - \sin(3\theta)$

    A) $2\cos(3\theta)\cos(5\theta)$ B) $2\sin(5\theta)\cos(2\theta)$

    C) $2\sin(2\theta)\cos(5\theta)$ D) $2\sin(2\theta)$

21) _____

Find the domain of the function f and of its inverse function f⁻¹.

22) $f(x) = 4\sin x - 8$

    A) Domain of f: $(-\infty, \infty)$ B) Domain of f: $(-\infty, \infty)$

        Domain of f⁻¹: $(-\infty, \infty)$ Domain of f⁻¹: $[-12, -4]$

    C) Domain of f: $[4, 12]$ D) Domain of f: $(-\infty, \infty)$

        Domain of f⁻¹: $[-12, -4]$ Domain of f⁻¹: $[4, 12]$

22) _____

Solve the equation on the interval $0 \le \theta < 2\pi$.

23) $\cot\left(2\theta - \dfrac{\pi}{2}\right) = 1$

A) $\dfrac{3\pi}{8}, \dfrac{7\pi}{8}$

B) $\dfrac{3\pi}{8}$

C) $\dfrac{\pi}{4}, \dfrac{5\pi}{4}, \dfrac{9\pi}{4}$, and $\dfrac{13\pi}{4}$

D) $\dfrac{3\pi}{8}, \dfrac{7\pi}{8}, \dfrac{11\pi}{8}$, and $\dfrac{15\pi}{8}$

23) _____

Complete the identity.

24) $\cos(\sin^{-1} v) = ?$

A) $\sqrt{v^2 + 1}$

B) $\sqrt{v^2 - 1}$

C) $\sqrt{1 - v^2}$

D) $\dfrac{\sqrt{v^2 + 1}}{v}$

24) _____

Two sides of a right triangle ABC (C is the right angle) are given. Find the indicated trigonometric function of the given angle. Give exact answers with rational denominators.

25) Find cot A when $a = 8$ and $c = 9$.

A) $\dfrac{9\sqrt{17}}{17}$

B) $\dfrac{\sqrt{17}}{8}$

C) $\dfrac{\sqrt{17}}{9}$

D) $\dfrac{8\sqrt{17}}{17}$

25) _____

Find the area of the triangle. If necessary, round the answer to two decimal places.

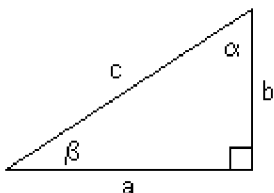26) $a = 12$, $b = 15$, $\gamma = 52°$

A) 141.84   B) 88.80   C) 35.46   D) 70.92

26) _____

Solve the right triangle using the information given. Round answers to two decimal places, if necessary.

27) $a = 8$, $b = 4$; Find c, α, and β.

A) c = 8.94
$\alpha = 64.43°$
$\beta = 25.57°$

B) c = 6.93
$\alpha = 64.43°$
$\beta = 25.57°$

C) c = 6.93
$\alpha = 63.43°$
$\beta = 26.57°$

D) c = 8.94
$\alpha = 63.43°$
$\beta = 26.57°$

27) _____

Solve the triangle. Find the angles α and β first.

28)
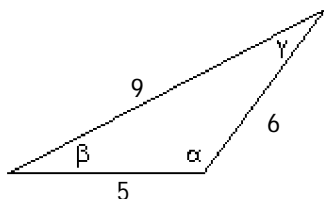
A) $\alpha = 109.5°$, $\beta = 38.9°$, $\gamma = 31.6°$

B) $\alpha = 38.9°$, $\beta = 109.5°$, $\gamma = 31.6°$

C) $\alpha = 38.9°$, $\beta = 31.6°$, $\gamma = 109.5°$

D) $\alpha = 109.5°$, $\beta = 31.6°$, $\gamma = 38.9°$

28) _____

Solve the triangle.

29) $a = 6$, $b = 8$, $\gamma = 70°$ 29) _____

    A) $c = 6.3$, $\alpha = 28.6°$, $\beta = 81.4°$ B) $c = 9$, $\alpha = 52.8°$, $\beta = 57.2°$

    C) $c = 8.2$, $\alpha = 43.5°$, $\beta = 66.5°$ D) $c = 10$, $\alpha = 56.9°$, $\beta = 53.1°$

Convert the angle in radians to degrees.

30) $\dfrac{\pi}{3}$ 30) _____

    A) $60\pi°$ B) $60°$ C) $3°$ D) $1°$

31) $\dfrac{47}{18}\pi$ 31) _____

    A) $940\pi°$ B) $470°$ C) $8°$ D) $235°$

Use the properties of the trigonometric functions to find the exact value of the expression. Do not use a calculator.

32) $\tan 20° \cot 20°$ 32) _____

    A) 1   B) 20   C) -1   D) 0

Use the information given about the angle θ, $0 \le \theta \le 2\pi$, to find the exact value of the indicated trigonometric function.

33) $\cos \theta = -\dfrac{3}{5}$, $\pi < \theta < \dfrac{3\pi}{2}$ Find $\cos \dfrac{\theta}{2}$.   33) _____

    A) $\dfrac{\sqrt{5}}{5}$ B) $-\dfrac{\sqrt{30}}{10}$ C) $\dfrac{\sqrt{30}}{10}$ D) $-\dfrac{\sqrt{5}}{5}$

Find the exact value of the composition.

34) $\sin(\tan^{-1}(2))$ 34) _____

    A) $\dfrac{5\sqrt{2}}{2}$ B) $5\sqrt{2}$ C) $2\sqrt{5}$ D) $\dfrac{2\sqrt{5}}{5}$

An object attached to a coiled spring is pulled down a distance a from its rest position and then released. Assuming that the motion is simple harmonic with period T, write an equation that relates the displacement d of the object from its rest position after t seconds. Also assume that the positive direction of the motion is up.

35) $a = 19$; $T = 9$ seconds   35) _____

    A) $d = -19 \cos\left(\dfrac{2}{9}\pi t\right)$ B) $d = -19 \cos\left(\dfrac{1}{9}\pi t\right)$

    C) $d = -9 \cos\left(\dfrac{2}{19}\pi t\right)$ D) $d = -19 \sin\left(\dfrac{2}{9}\pi t\right)$

Solve the problem.

36) A rocket tracking station has two telescopes A and B placed 1.9 miles apart. The telescopes lock   36) _____
onto a rocket and transmit their angles of elevation to a computer after a rocket launch. What is the
distance to the rocket from telescope B at the moment when both tracking stations are directly east
of the rocket telescope A reports an angle of elevation of 23° and telescope B reports an angle of
elevation of 58°?

    A) 0.88 mi   B) 1.29 mi   C) 4.12 mi   D) 2.81 mi

Use the fact that the trigonometric functions are periodic to find the exact value of the expression. Do not use a calculator.

37) $\csc 1020°$

37) _____

    A) $-\dfrac{1}{2}$ B) $-\sqrt{2}$ C) $-\dfrac{2\sqrt{3}}{3}$ D) $-\sqrt{3}$

Find the exact value under the given conditions.

38) $\cos\alpha = -\dfrac{5}{13},\ \dfrac{\pi}{2} < \alpha < \pi;\quad \sin\beta = \dfrac{8}{17},\ \dfrac{\pi}{2} < \alpha < \pi$ Find $\tan(\alpha + \beta)$.

38) _____

    A) $-\dfrac{220}{221}$ B) $\dfrac{20}{3}$ C) $\dfrac{220}{21}$ D) $-\dfrac{220}{171}$

An object attached to a coiled spring is pulled down a distance a from its rest position and then released. Assuming that the motion is simple harmonic with period T, write an equation that relates the displacement d of the object from its rest position after t seconds. Also assume that the positive direction of the motion is up.

39) $a = 19;\quad T = 4\pi$ seconds

39) _____

    A) $d = -4\cos\left(\dfrac{2}{19}t\right)$ B) $d = -19\cos\left(\dfrac{1}{2}\pi t\right)$

    C) $d = -19\sin\left(\dfrac{1}{2}\pi t\right)$ D) $d = -19\cos\left(\dfrac{1}{2}t\right)$

Convert the angle to D° M' S" form. Round the answer to the nearest second.

40) $258.68°$

40) _____

    A) $258°40'48''$ B) $258°40'68''$ C) $258°41'47''$ D) $258°47'68''$

1) A
2) A
3) A
4) D
5) B
6) A
7) B
8) D
9) A
10) B
11) A
12) C
13) C
14) B
15) C
16) A
17) D
18) B
19) C
20) D
21) C
22) B
23) D
24) C
25) B
26) D
27) D
28) A
29) C
30) B
31) B
32) A
33) D
34) D
35) A
36) B
37) C
38) C
39) D
40) A