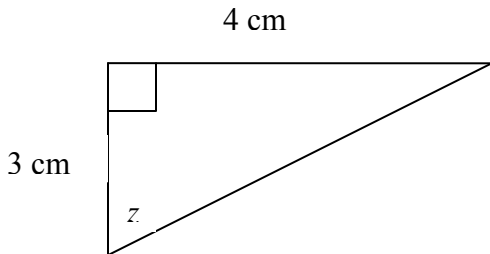


Math 111 Review Problems
Multiple Choice

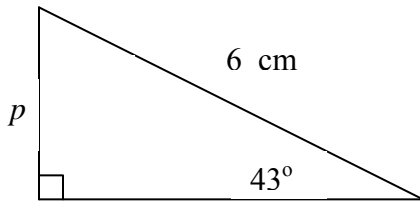
Please note that NOTA = none of the above

- (1) Find z to be the nearest $\frac{1}{10}$ of a degree



- a) 41.4° b) 48.6° c) 36.9° d) 53.1° e) NOTA

- (2) Find the length of side p . Round to two places.



- a) 4.09 cm b) 4.39 cm c) 5.60 cm d) 3.49 cm e) NOTA

- (3) Convert 600 degrees to radians.

- a) $\frac{10\pi}{3}$ b) $\frac{28\pi}{9}$ c) $\frac{26\pi}{9}$ d) $\frac{32\pi}{9}$ e) NOTA

- (4) Convert 4.3 radians to degrees. Round to the nearest degree.

- a) 14° b) 774° c) 493° d) 126° e) NOTA

- (5) Find the period of $y = -4 \cot 2x$

- a) π b) $\frac{\pi}{2}$ c) 2π d) $\frac{\pi}{4}$ e) NOTA

(6) Find the phase shift of the function $y = -4 \sin(2\pi x + \pi)$

- a) $-\frac{\pi}{4}$ b) $\frac{1}{2}$ c) $-\frac{1}{2}$ d) $-\frac{\pi}{4}$ e) 2π

(7) The solutions of $\cos^2 x - \cos x - 2 = 0$ are (where k denotes an arbitrary integer)

- a) $2k\pi$ b) $\frac{\pi}{2} + 2k\pi$ c) $\pi + 2k$ d) $-\pi + 2k\pi$ e) $k\pi$

(8) The exact value of $\csc\left(-\frac{\pi}{3}\right)$ is

- a) 2 b) $\frac{\sqrt{3}}{2}$ c) $-\frac{1}{2}$ d) -2 e) $-\frac{2}{\sqrt{3}}$

(9) An angle measured in standard position has the point (4,-5) on its terminal ray. What is $\cos(\theta)$?

- a) $\frac{4}{\sqrt{41}}$ b) $-\frac{5}{\sqrt{41}}$ c) $\frac{5}{\sqrt{41}}$ d) $-\frac{4}{\sqrt{41}}$ e) $-\frac{4}{5}$

(10) Simplify the expression $\frac{1}{\cos^2 a} - 1$ using fundamental identities. The result is

- a) $\cot^2 a$ b) $\sec^2 a$ c) 0 d) $\tan^2 \alpha$ e) NOTA

(11) $\frac{\sec^2 x - 1}{\tan x} =$

- a) 1 b) $\tan x$ c) $\tan^3 x$ d) $\cot x$ e) $\cot^2 x$

(12) Given that $\cos \theta = \frac{\sqrt{3}}{2}$ and θ is acute, what is value of θ ?

- a) 30° b) 45° c) 60° d) 15° e) -30°

(13) Convert 2.1 radians to degrees. (Round to three significant figures).

- a) 0.0367° b) 378° c) 120° d) 240° e) NOTA

(14) If the radius of a circle is 3 cm., then the measure of the central angle that cuts an arc of length 6cm is

- a) 2 rad b) 120° c) $\frac{1}{2} \text{ rad}$ d) 30° e) 2π

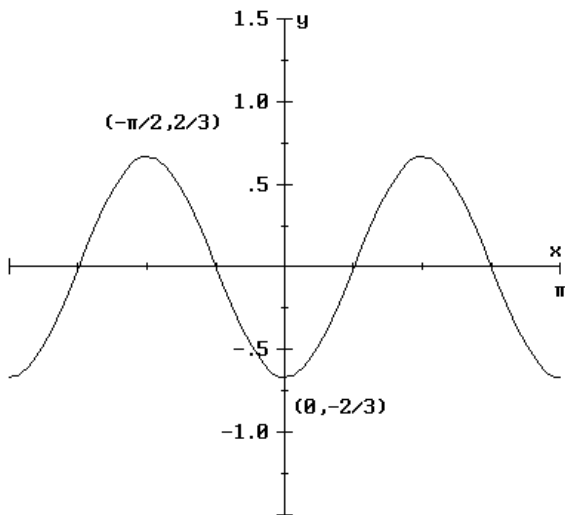
(15) The length of an arc intercepted by an angle of 60° on a circle of radius 6 is

- a) π b) 2π c) 2 d) $\frac{\pi}{2}$ e) $\frac{1}{12}$

(16) Given that $\tan \theta = \frac{\sqrt{3}}{3}$ and θ is acute, what is value of θ ?

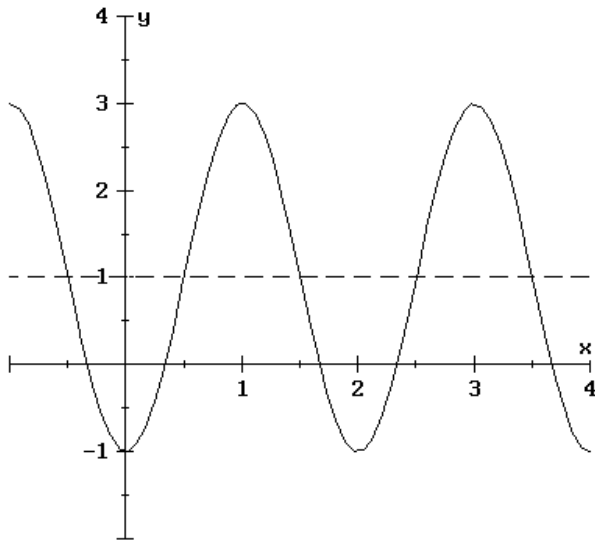
- a) 30° b) 45° c) 60° d) 15° e) -30°

(17) The amplitude of function shown below is



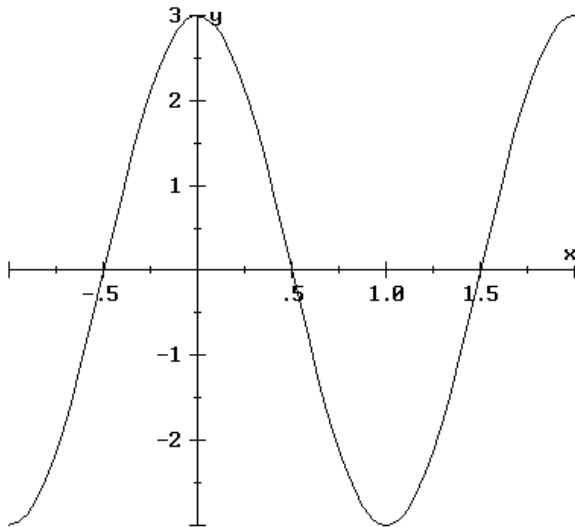
- a) $\frac{2}{3}$ b) 1 c) $-\frac{3}{2}$ d) $-\frac{2}{3}$ e) NOTA

(18) The equation of the graph below is



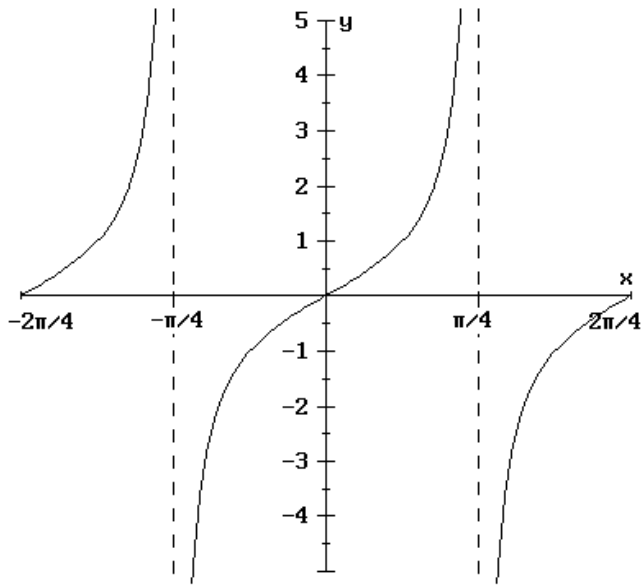
- a) $y = 2 + 3 \cos(2x + 2)$ b) $y = 1 + 2 \cos(\pi x + \pi)$
 c) $y = 1 + 2 \sin(\pi x - \pi)$ d) $y = 2 + 3 \sin(2x - 2)$
 e) NOTA

(19) The graph shows $y = 3 \sin(Bx + C)$. $B =$



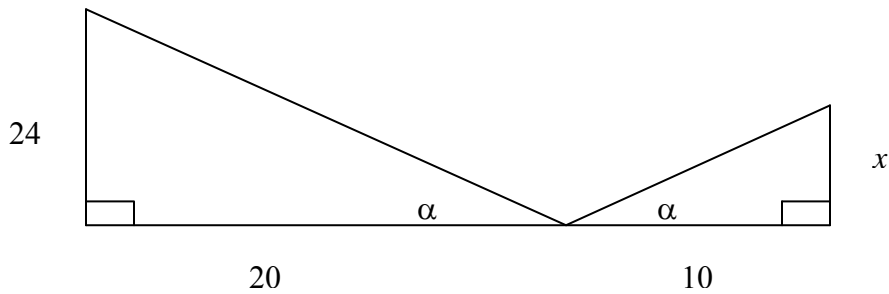
- a) 1 b) π c) $-\frac{\pi}{2}$ d) $\frac{3\pi}{2}$ e) $\frac{1}{2}$

(20) Find the equation of the graph



- a) $y = \tan \frac{\pi}{2}x$ b) $y = \tan 4x$
 c) $y = \tan 2x$ d) $y = \tan \frac{1}{2}x$
 e) NOTA

(21) Given the figure, find x



- a) 12 b) 40 c) 20 d) 48 e) 36

(22) A central angle of 63° is in a circle of radius 18cm. How long is the arc cut by the angle?
 Round to 2 places.

- a) 19.79 cm b) 9.90 cm c) 39.58 cm d) 79.16 cm e) NOTA

(23) A pole casts a 10 foot shadow. A man who is 6 feet tall casts a 3.5 foot shadow. How tall is the pole?

- a) 5.83 ft b) 2.10 ft c) 17.14 ft d) 21.00 ft e) NOTA

(24) Tim is 4'3" tall, and his brother Tom is 5'9". If Tim casts a 9 foot shadow, how long of a shadow will Tom cast?

- a) 6.65 ft b) 12.18 ft c) 2.71 ft d) 24.44 ft e) NOTA

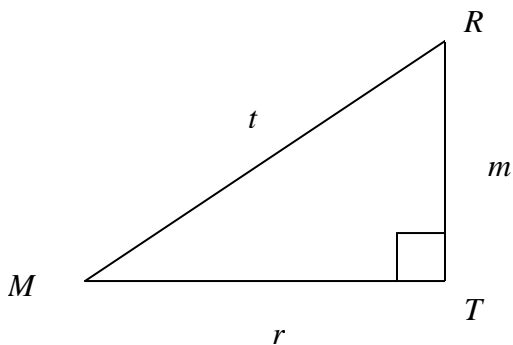
(25) A central angle of 70 degrees cuts an arc of 6 feet. Find the radius of the circle.

- a) 6 ft b) 5.14 ft c) 9.82 ft d) 12 ft e) NOTA

(26) A central angle cuts an arc of 45 m in a circle whose radius is 9 m. Find the measure of the angle. Round to one place.

- a) 405.0° b) 452.4° c) 286.5° d) 202.5° e) NOTA

Use the following figure for 27 and 28.



(27) Which ratio is equal to $\sec R$?

- a) $\frac{r}{t}$ b) $\frac{r}{m}$ c) $\frac{m}{t}$ d) $\frac{m}{r}$ e) NOTA

(28) Which ratio is equal to $\sin M$?

- a) $\frac{m}{r}$ b) $\frac{m}{t}$ c) $\frac{r}{t}$ d) $\frac{t}{m}$ e) NOTA

For 29, 30 use 3.14 for π . Which of the listed values is NOT coterminal with the given value of x ?

(29) $x = -4.19$

- a) 14.65 b) -16.75 c) 17.79 d) 20.93 e) NOTA

(30) $x = 86.05$

- a) 60.93 b) 48.37 c) 32.67 d) 16.97 e) NOTA

For 31 and 32, A is in Quadrant III and $\sin A = -\frac{3}{5}$.

(31) Find $\cos A$.

- a) $-\frac{4}{5}$ b) $\frac{4}{5}$ c) $\frac{3}{5}$ d) $-\frac{3}{5}$ e) NOTA

(32) Find $\tan A$.

- a) $\frac{3}{4}$ b) $-\frac{3}{4}$ c) $\frac{4}{3}$ d) $-\frac{4}{3}$ e) NOTA

(33) Angle B is in standard position in Quadrant II, and $\sin B = \frac{3}{\sqrt{58}}$.

Find a point on the terminal side of angle B .

- a) $(3, \sqrt{58})$ b) $(3, 7)$ c) $(-7, 3)$ d) $(7, 3)$ e) NOTA

(34) Angle C is in standard position in quadrant III, and $\cos C = \frac{-4}{9}$. Find a point on the terminal side of angle C .

- a) $(\sqrt{65}, 9)$ b) $(-\sqrt{65}, 9)$ c) $(\sqrt{97}, 9)$ d) $(-\sqrt{97}, 9)$ e) NOTA

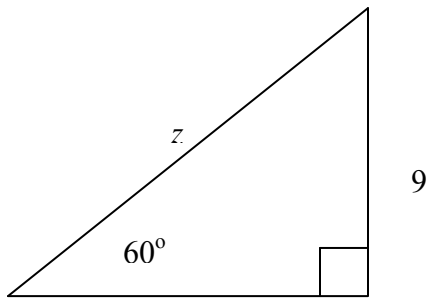
(35) Find $\sin\left(\frac{7\pi}{6}\right)$ exactly.

- a) $\frac{\sqrt{3}}{2}$ b) $-\frac{\sqrt{3}}{2}$ c) $-\frac{1}{2}$ d) $\frac{1}{2}$ e) NOTA

(36) Find $\cos\left(\frac{-4\pi}{3}\right)$ exactly.

- a) $\frac{\sqrt{3}}{2}$ b) $-\frac{\sqrt{3}}{2}$ c) $-\frac{1}{2}$ d) $\frac{1}{2}$ e) NOTA

(37) Find z exactly.



- a) 9 b) $\frac{9\sqrt{3}}{2}$ c) $\frac{18}{\sqrt{3}}$ d) 18 e) NOTA

(38) A function $y = f(x)$ is periodic with period 6. If $f(2) = 3$, find another value for x such that $f(x) = 3$.

- a) 3 b) 5 c) 8 d) 9 e) NOTA

(39) Let $m = \sin x$, with $-1 \leq m \leq 1$. If $x = n$, with $0 \leq n \leq \frac{\pi}{2}$, is one solution, find another solution.

- a) $-n$ b) $2\pi - n$ c) $\pi - n$ d) $\pi + n$ e) NOTA

For 40, 41, 42, and 43 consider the function $y = -5 - 4 \sin(3x - 2)$.

(40) The amplitude is

- a) -5 b) -4 c) 3 d) 2 e) NOTA

(41) What is the vertical shift?

- a) 5 down b) 5 up c) 4 down d) 4 up e) NOTA

(42) What is the period?

- a) 2π b) 6π c) $\frac{2\pi}{3}$ d) π e) NOTA

(43) What is the horizontal shift?

- a) 2 left b) 1.5 right c) 2 right d) $\frac{2}{3}$ left e) NOTA

(44) If $\cos m = n$ and $\sin m = k$, then

- a) $\cos(-m) = -n$ and $\sin(-m) = -k$ b) $\cos(-m) = n$ and $\sin(-m) = k$
c) $\cos(-m) = -n$ and $\sin(-m) = k$ d) $\cos(-m) = n$ and $\sin(-m) = -k$
e) NOTA

(45) A cosine function has period 12 and amplitude 8. It is also known that $f(5) = 30$ is the maximum function value. Find $f(11)$.

- a) Not enough information b) 24 c) 22 d) 14 e) NOTA

(46) Find exactly $\sin^{-1}\left(\frac{-\sqrt{3}}{2}\right)$.

- a) $\frac{\pi}{3}$ b) $\frac{2\pi}{3}$ c) $\frac{-\pi}{3}$ d) $\frac{-2\pi}{3}$ e) NOTA

(47) Find exactly $\cos^{-1}(-.5)$.

- a) $\frac{-\pi}{6}$ b) $\frac{\pi}{6}$ c) $\frac{-\pi}{3}$ d) $\frac{\pi}{3}$ e) NOTA

(48) In $\triangle ABC$

$$A = 40^\circ$$

$$a = 2.6\text{m}$$

$$B = 60^\circ$$

Find b .

- a) 3.5m b) 3.9m c) 1.9m d) 2.7m e) NOTA

(49) In $\triangle ABC$

$$a = 5 \text{ ft}$$

$$b = 3 \text{ ft}$$

$$C = 68^\circ$$

Find c . Round to two places.

- a) 45.24 ft b) 22.7 ft c) 6.73 ft d) 4.77 ft e) NOTA

(50) Solve $\sin x = .5$ on $[0, 2\pi]$.

a) $\frac{\pi}{6}$ is the only solution b) $\frac{\pi}{3}$ is the only solution

c) $\frac{\pi}{6}, \frac{5\pi}{6}$ d) $\frac{\pi}{3}, \frac{2\pi}{3}$

e) NOTA

(51) What is the range of $y = \sin x$?

- a) $[-1, 1]$ b) $[0, 2\pi]$ c) $[-\pi, \pi]$ d) $(-\infty, \infty)$ e) NOTA

(52) What is the range of $y = \sin^{-1} x$?

- a) $[0, 2\pi]$ b) $[-1, 1]$ c) $[0, \pi]$ d) $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$ e) NOTA

(53) What is the range of $y = \tan^{-1} x$?

- a) $(-\infty, \infty)$ b) $[0, 2\pi]$ c) $[0, \pi]$ d) $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$ e) NOTA

(54) $y = g(x)$ is periodic with period 5; $g(6.1) = 9.7$. Find $g(21.1)$.

- a) 5 b) 6.1 c) 9.7 d) 24.7 e) NOTA

(55) A cosine function has period 12 and its maximum value at $x = 5$. At what x value will the function have a minimum?

- a) 8 b) 11 c) 14 d) 17 e) NOTA

(56) A tangent function has period 16, a horizontal intercept at $x = 9$, and no vertical shift. At what x value will the graph of this function have a vertical asymptote?

- a) 13 b) 17 c) 21 d) 25 e) NOTA

Math 111 Review Problems
Partial Credit Problems

(1) Sketch angles in standard position.

a) -300 degrees

b) 500 degrees

c) 150 degrees

d) 3π

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

f) -3

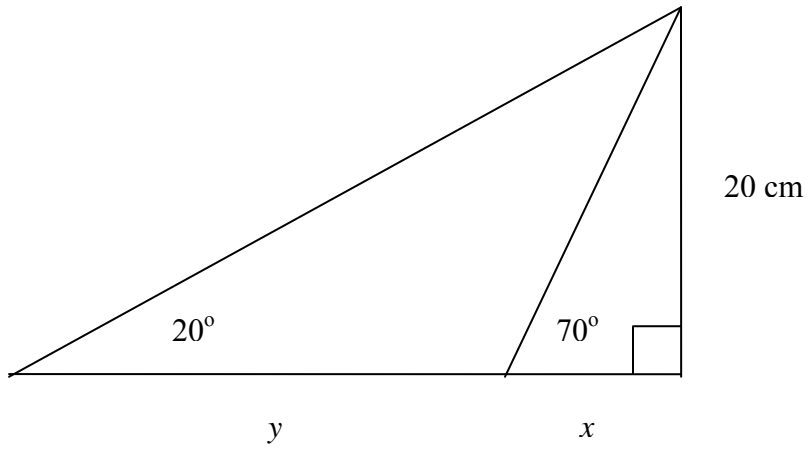
g) 6

h) $\cos^{-1}\left(\frac{4}{5}\right)$

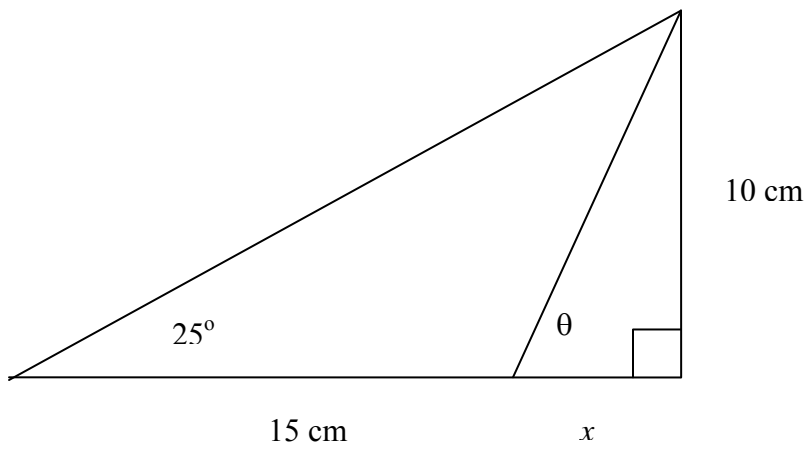
i) $\cos^{-1}\left(-\frac{2}{3}\right)$

j) $\tan^{-1}\left(-\frac{5}{3}\right)$

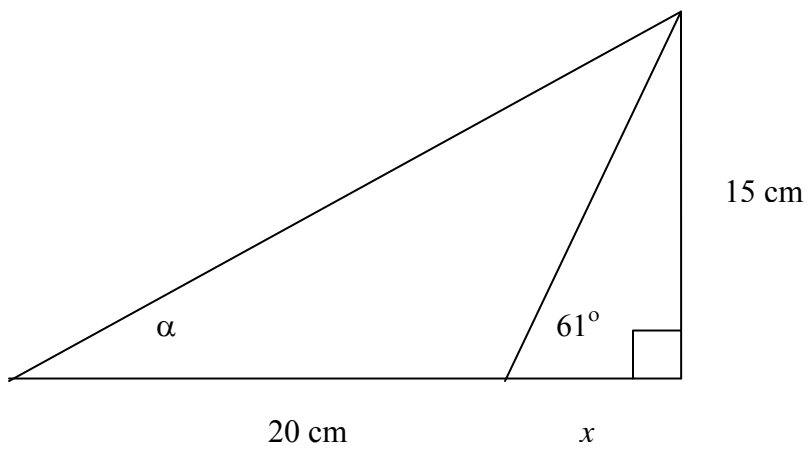
(2) Find x and y .



(3) Find θ and x .



(4) Find α and x .



(5) Use the fundamental identities to find the exact value of $\sin x$, $\csc x$, and $\tan x$ given that $\cos x = \frac{2}{3}$ and $\csc x < 0$.

(6) Use a sketch of the unit circle to explain why:

a) the function $y = \sin x$ is periodic.

b) the function $y = \tan x$ has the vertical asymptotes where it does

c) the function $y = \cos x$ has the range that it does

(7) Use the identity for $\cos(x + y)$ to derive an identity for $\cos(2x)$.

(8) Find the exact value of $\sin\left(\frac{\pi}{12}\right)$.

(9) Find the exact value of $\cos\left(\frac{5\pi}{12}\right)$.

For Problems 10, 11, and 12 find one solution analytically, then find other solutions by any method.

(10) $4.4 - 3.2 \cos(1.2x) = 5.1$ on the interval $[0, 10]$.

(11) $2.7 \tan(.2x) = -6.5$ on $[0, 50]$.

(12) $500 + 25 \sin(.52x) = 512$ on $[0, 12]$.

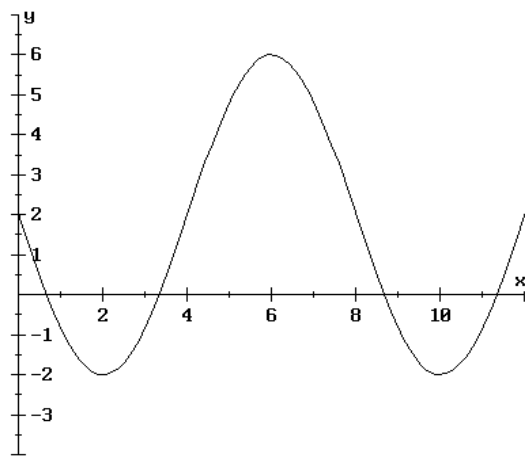
(13) Angle $A = \frac{2\pi}{3}$, and angle A is in standard position. The terminal side of angle A intersects the unit circle at the point (a, b) . Find the exact values of a and b .

(14) Repeat for angle $B = \frac{7\pi}{6}$.

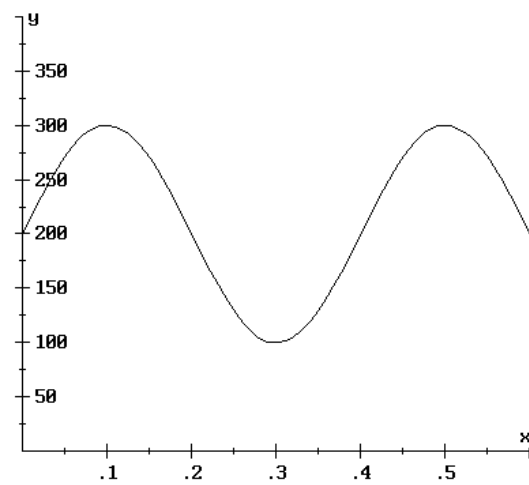
(15) Repeat for angle $C = \frac{5\pi}{4}$.

(16) Find a possible formula for each graph

a)



b)



(17) Simplify each expression by writing it without using any trigonometric functions. Find an exact value whenever possible.

a) $\sin^{-1}\left(\sin\frac{7\pi}{6}\right)$

b) $\sin(\sin^{-1}.5)$

c) $\sin(\cos^{-1}0)$

d) $\sin(\cos^{-1}x)$

e) $\tan(\sin^{-1}x)$

(18) Find a possible formula for each data table.

a)

x	0	1	2	3	4
y	6	4	2	4	6

b)

x	$-\pi$	0	π	2π
y	Undefined	0	Undefined	0

c)

x	-1	-0.5	0	0.5	1	1.5
y	-10	-7	-10	-13	-10	-7

(19) A sine function $y = f(x)$ has a period of 8 and amplitude of 3. It is also known that $f(2) = 18$ is a minimum value of the function.

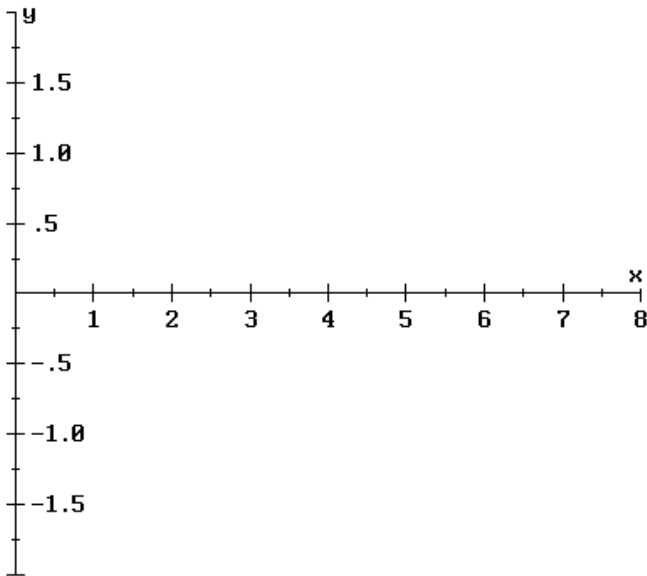
- Find the maximum value of the function.
- List three values for x that produce a maximum value.
- List three values for x that produce the average value of the function.
- Write an equation for this function.

(20) Solve each triangle ABC , if possible. If there is no such triangle, explain how you know. If two triangles are possible, solve both.

- $a = 5$ cm, $b = 6$ cm, $c = 7$ cm
- $a = 6.17$ in, $b = 11.52$ in, $c = 17.41$ in
- $a = 5$ ft, $b = 7$ ft, $C = 78$ deg
- $a = 10$ m, $b = 6$ m, $B = 25$ deg
- $a = 5$ cm, $b = 6$ cm, $B = 35$ deg
- $A = 40$ deg, $B = 50$ deg, $c = 6$ ft

(21)

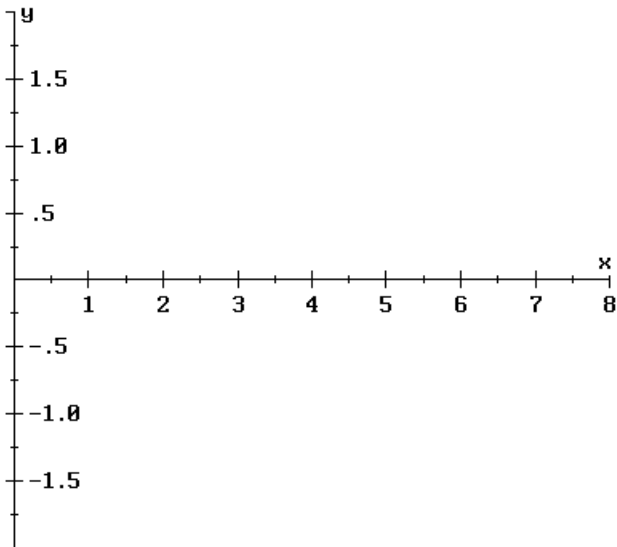
a) On the given axes, make a sketch of $y = \cos x$.



b) Indicate on the graph approximate solutions to $\cos x = -0.4$

c) For each solution indicate the corresponding quadrant of the unit circle.

(22) Repeat #21 with $y = \sin x$ and $\sin x = -0.7$



(23) A cosine function $y = g(x)$ has its average value at $x = 2$ and $x = 10$.

- a) List three values that could be the period of this function.
- b) What is the largest possible period for this function? Explain.