MA 154   Exam 1   Spring 2002

1) Which of the following angles is NOT coterminal with 300°?

    A) $-\dfrac{}{3}$ **B) –30°**   C) 660°   D) -420°   E) $\dfrac{11}{3}$

A) $-\dfrac{}{3} = -60°;\ -60° + 360° = 300°$

B) $-30° + 360° = 330°$

C) $660 - 360° = 300°$

D) $-420° + 360° = 300°$

E) $\dfrac{11}{3} - 2 = \dfrac{11}{3} - \dfrac{6}{3} = \dfrac{5}{3} = 300°$

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2) Find the angle that is supplementary to 57° 42' 59".

    A) 31° 18' 1"   B) 122° 28' 1"   **C) 122° 17' 1"**   D) 123° 12' 1"   E) 32° 17' 1"

$180° = 179°\ 59'\ 60"$

$179°59'60"$

$-\ 57°42'59"$

$122°17'\ 1"$

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3) Find all of the values of *x*, in the interval $[0, 2\ )$, which satisfy the equation $\cot x = -8.125$. Round your answer to two decimal places.

    A) 6.16, 3.26   B) 0.28, 3.42   C) 0.12, 3.26   **D) 6.16, 3.02**   E) 0.12, 3.02

$\cot x = \dfrac{1}{\tan x}$

$\cot x = -8.125$

$\tan x = -\dfrac{1}{8.125} = -0.1231$

$x = -0.1225$

$x_1 = 2\ -0.1225 = 6.28 - 0.1225 = 6.16$

$x_2 = -0.1225 = 3.14 - 0.1225 = 3.02$

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4) Which of the following is equivalent to $\cos(-x)\sin(-x)\sec(x)$?

    A) $\sin x$ B) $\cos x$ C) $-\cos x$ **D) $-\sin x$**   E) $\tan x$

$\cos(-x)\sin(-x)\sec(x) =$

$(\cos x)(-\sin x)\ \dfrac{1}{\cos x}\ =$

$-\sin x = -\sin x$

5)   Approximate the value of $\cos 50°18'$. Round your answer to 4 decimal places.

   A) 0.9994   B) 0.6414   **C) 0.6388**   D) 0.6404   E) 0.7681

$$50°18' = 50.3°$$
$$\cos 50.3° = 0.6388$$

6)   Find the area of the sector determined by the central angle , if   is subtended by an
      arc of length 7.5 cm on a circle of radius 2.3 cm. Round your answer to three
      decimal places.
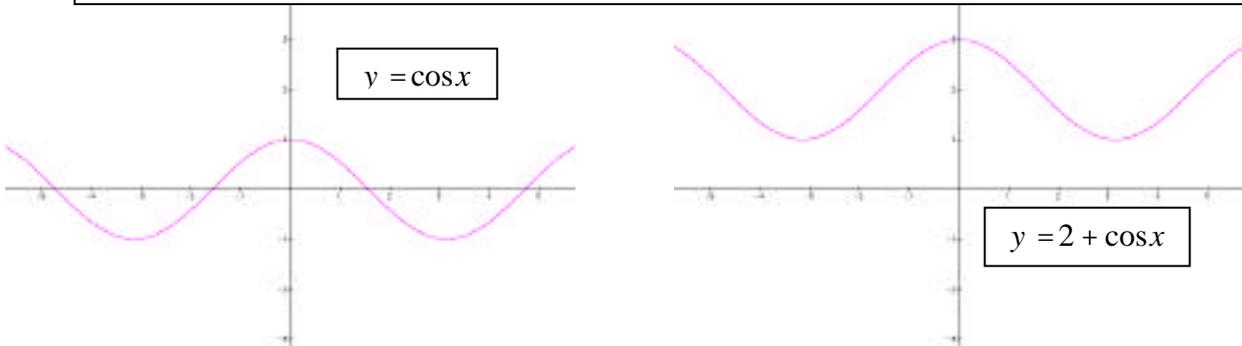
   A) 3.750 cm²   B) 5.943 cm²   C) 3.261 cm²   D) 17.250 cm²   **E) 8.625 cm²**

$s = r$ (where   is in radians) $A = \dfrac{1}{2}r^2$ (where   is in radians)

$$7.5 = 2.3$$ $$A = \dfrac{1}{2}(2.3^2)(3.2609)$$

$$= 3.2609$$ $$A = 8.625 \ cm^2$$

7)   The values of y of the graph of $y = 2 + \cos x$ vary from:

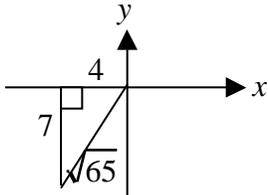   A)   –3 to 3   **B. 1 to 3**   C. 0 to 2   D. –3 to –1   E. –2 to 2

Since the vales of y in the equation $y = \cos(x)$ vary from –1 to 1, the values of y in the
equation $y = 2 + \cos(x)$ will vary from 1 to 3.

$y = \cos x$

$y = 2 + \cos x$

8)   Find the exact value of $\sin\theta$, if $\tan\theta = \dfrac{7}{4}$ and $\cos\theta < 0$.

   A) $\dfrac{4}{\sqrt{33}}$ **B)** $-\dfrac{7}{\sqrt{65}}$ C) $-\dfrac{7}{\sqrt{33}}$ D) $-\dfrac{4}{\sqrt{65}}$ E) $\dfrac{7}{\sqrt{65}}$

> Since $\cos\theta < 0$ and $\tan\theta > 0$, θ is a Quadrant III angle.
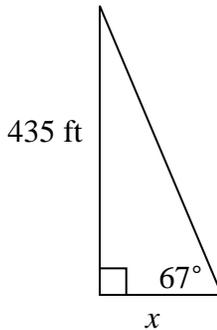
$$c^2 = 7^2 + 4^2$$
$$c^2 = 49 + 16 = 65$$
$$c = \sqrt{65}$$

$$\sin\theta = \dfrac{-7}{\sqrt{65}}$$

9)   The height of a building is known to be 435 feet. From a point away from the base of the building, along level ground, Bill finds the angle of elevation of the top of the building is 67°. How far is Bill from the base of the building? Round your answer to the nearest tenth of a foot.

   A) 400.4 feet   B) 1113.3 feet   C) 1024.8 feet   **D) 184.6 feet**   E) 472.6 feet
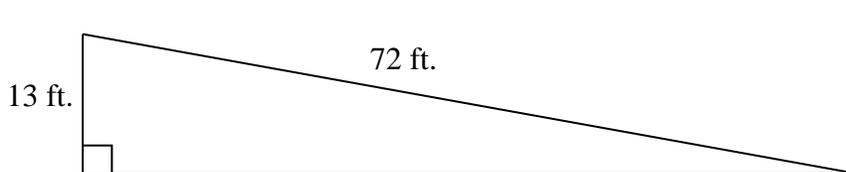
$$\tan 67° = \dfrac{435}{x}$$
$$x\tan 67° = 435$$
$$x = \dfrac{435}{\tan 67°} = \dfrac{435}{2.3558}$$
$$x = 184.6 \ ft.$$

10)   A 72-foot ramp of reaches from a point on the ground to a point 13 feet above the ground. What is the degree measure of the angle between the ground and the ramp? Round your answer to one-decimal place.

   A) 10.2°   B) 79.6°   C) 5.5°   **D) 10.4°**   E) 30.0°

$$\sin\theta = \dfrac{13}{72}$$
$$\sin\theta = 0.1806$$
$$\theta = 10.4°$$

11) As $x \to \dfrac{2}{}^{+}$, $\tan x \to$ _____?

   **A)** $-\infty$ B) ∞ C) 0   D) 1   E) –1

Looking at the graph, of $y = \tan(x)$ on page 389 of your text, as x approaches $\dfrac{-}{2}$ from the right, the graph, in that region, is going down to $-\infty$

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12) What is the reference angle, θ_R, of $\theta = 8$? Round your answer to two decimal places.

   A) $\theta_R = 1.72$ B) $\theta_R = 4.86$ **C) $\theta_R = 1.42$**   D) $\theta_R = -1.72$ E) $\theta_R = -1.42$

θ is coterminal with $8 - 2\pi$; $8 - 2\pi = 1.7168$

θ is in QII since $\dfrac{\pi}{2} < 1.7168 < \pi$.

$\theta_R = \pi - 1.7168 = 1.42$

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13) Given the right triangle below, which of the following is true?
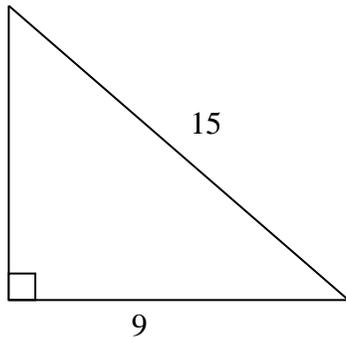
   A) $\csc\theta = \dfrac{15}{12}$ B) $\sec\theta = \dfrac{9}{15}$ C) $\tan\theta = \dfrac{9}{12}$ D) $\cot\theta = \dfrac{15}{9}$ E) $\cos\theta = \dfrac{12}{9}$
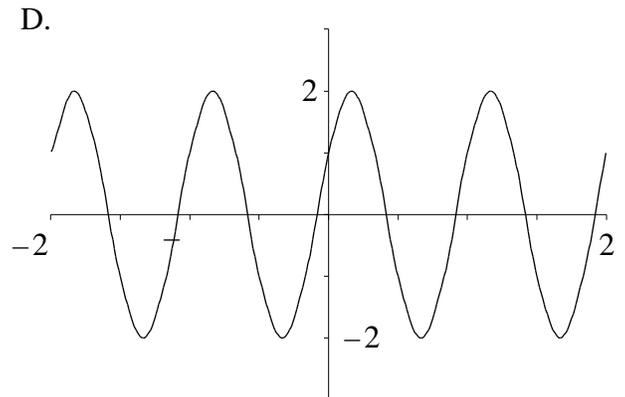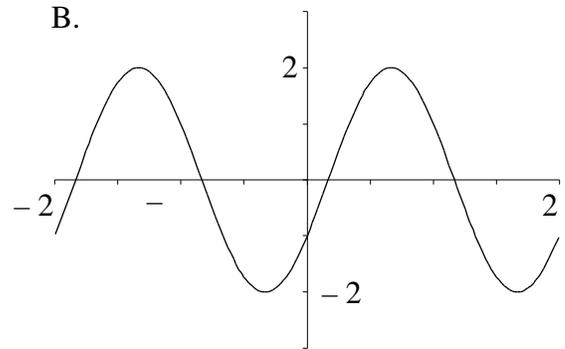
$a^2 + 9^2 = 15^2$

$a^2 + 81 = 225$

$a^2 = 144$

$a = 12$

$\sin\theta = \dfrac{12}{15}$ $\csc\theta = \dfrac{15}{12}$

$\cos\theta = \dfrac{9}{15}$ $\sec\theta = \dfrac{15}{9}$

$\tan\theta = \dfrac{12}{9}$ $\cot\theta = \dfrac{9}{12}$

14) Which of the following is the graph of $y = 2\sin\left(x + \dfrac{\pi}{6}\right)$?

A.

B.

C.

D.

E.
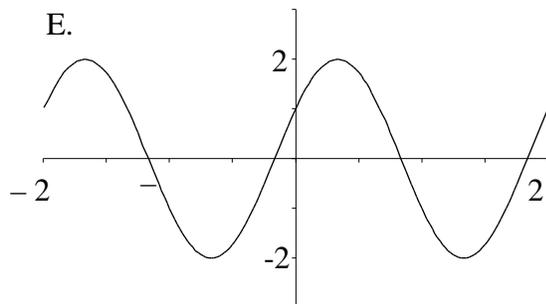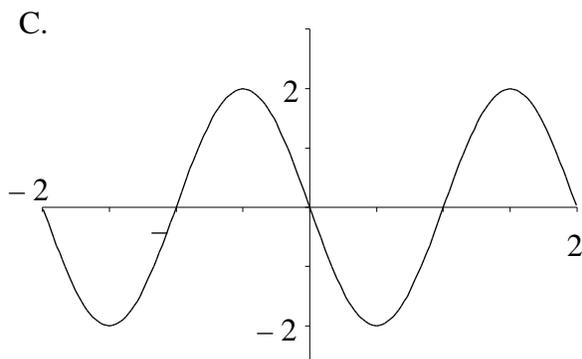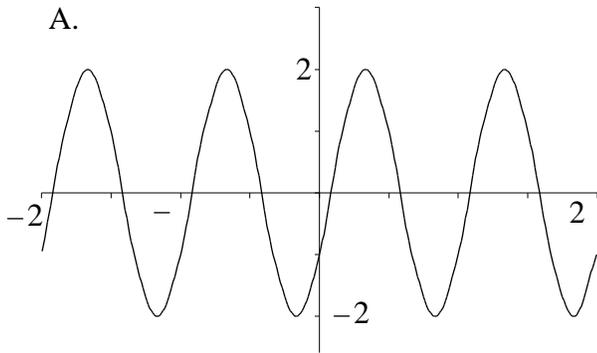
This is in the form $y = a\sin(bx + c)$

Amplitude = a, therefore Amplitude = 2 and the values of y will vary from –2 to 2.

Period $= \dfrac{2\pi}{b}$, therefore Period $= \dfrac{2\pi}{1} = 2\pi$

Phase shift $= -\dfrac{c}{b}$, therefore Phase shift $= -\dfrac{\frac{\pi}{6}}{1} = -\dfrac{\pi}{6}$

The only graph that is shifted 30° to the left and has a period of 2π is E.