MA 15400

Spring 2014

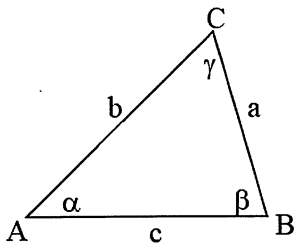
Exam 1

PYTHAGOREAN IDENTITIES:

$\sin^2\theta + \cos^2\theta = 1$

$1 + \tan^2\theta = \sec^2\theta$

$1 + \cot^2\theta = \csc^2\theta$



Solutions

MA 15400 Exam 1 Spring 2014

Lessons 1-11, All of Sections 6.1, 6.2, 6.3, 6.4, 6.5.

1. Find the angle that is supplementary to 48°57'9"

$179^\circ 59' 60''$

$-\ 48^\circ\ 57'\ 9''$

$131^\circ\ 2'\ 51''$

A. 131°2'51"

B. 41°52'41"

C. 41°2'51"

D. 131°52'41"

E. None of the above

2. Express the angle 153°8'36"as a decimal, to the nearest ten-thousandth of an angle.

$\frac{8'}{60'} = 0.1333$

$\frac{36''}{3600''} = 0.0100$

0.1433

153.1433°

A. 153.6022°

B. 153.1433°

C. 153.4383°

D. 153.7667°

E. None of the above

3. If a circular arc of the given length $s = 5.2$ km subtends the central angle $\theta = 76°$ on a circle, find the radius of the circle. Round your answer to the nearest hundredth.

$S = r\theta$

$5.2 = r\left(\frac{76^\circ \pi}{180^\circ}\right)$

$5.2 = r(1.3265)$

$\frac{5.2}{1.3265} = r$

$r = 3.92$

A. 9.95 *km*

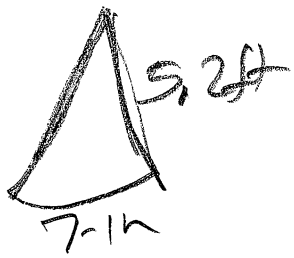
B. 3.17 *km*

C. 12.32 *km*

D. 3.92 *km*

E. None of the above

4. A pendulum in a grandfather clock is 5.2 feet long and swings back and forth along a 7-inch arc. Approximate the angle through which the pendulum passes during one swing. Round your answer to the nearest tenth of a degree. (1 foot = 12 inches)



$S = r\theta$

$7 = (62.4)\theta$

$\frac{7}{62.4} = \theta$

$\theta = 0.112$

$5.2 \times 12 = 62.4$ in

$\theta = 0.112\left(\frac{180^\circ}{\pi}\right)$

$\theta = 6.4^\circ$

A. 6.4°

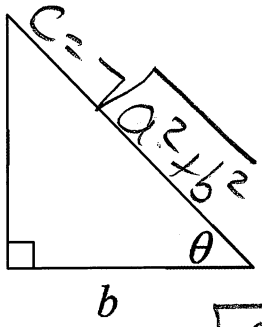
B. 6.6°

C. 6.2°

D. 6.8°

E. None of the above

5. Which one of the following statements is true for the given triangle?



$\sin\theta = \frac{a}{\sqrt{a^2+b^2}}$ a

$\cos\theta = \frac{b}{\sqrt{a^2+b^2}}$

$\tan\theta = \frac{a}{b}$

$\cot\theta = \frac{b}{a}$

$c^2 = a^2 + b^2$

$c = \sqrt{a^2+b^2}$

$\csc\theta = \frac{\sqrt{a^2+b^2}}{a}$

$\sec\theta = \frac{\sqrt{a^2+b^2}}{b}$

A. $\sec\theta = \frac{\sqrt{a^2+b^2}}{a}$ X

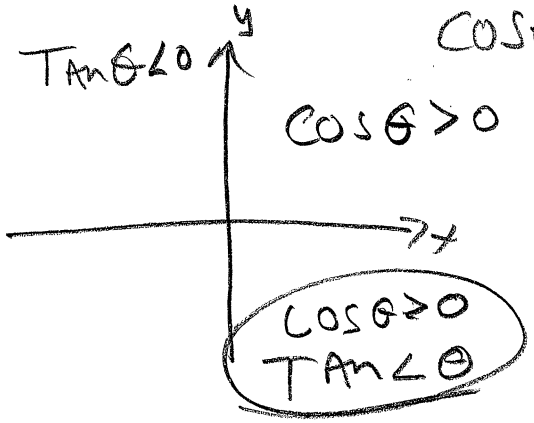
B. $\csc\theta = \frac{\sqrt{a^2+b^2}}{b}$ X

C. $\cos\theta = \frac{b}{\sqrt{a^2+b^2}}$ ✓

D. $\sin\theta = \frac{b}{\sqrt{a^2+b^2}}$ X

E. More than one of the above answers are correct. X

6. Find the quadrant containing θ if $\sec\theta > 0$ and $\tan\theta < 0$.



A. *I*

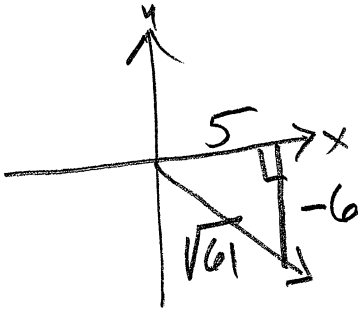
B. *II*

C. *III*

D. *IV*

E. None of the above

7. Find the exact value of $\sin(\theta)$ if θ is in standard position and the terminal side of θ is in QIV and is parallel to the line through $A(6,2)$ and $B(1,8)$.



$m = \frac{8-2}{1-6} = \frac{6}{-5}$

$\tan\theta = -\frac{6}{5} = \frac{y}{x}$

$c^2 = 5^2 + 6^2$

$c = \sqrt{61}$

$\sin\theta = \frac{-6}{\sqrt{61}}$

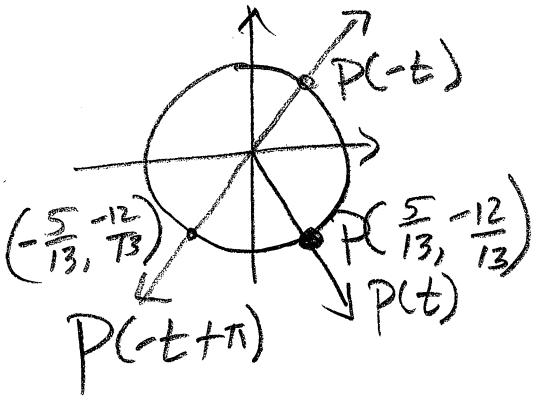
A. $\frac{-6}{\sqrt{61}}$

B. $\frac{5}{\sqrt{61}}$

C. $\frac{-5}{\sqrt{61}}$

D. $\frac{6}{\sqrt{61}}$

8. Let $P(t)$ be the point on the unit circle U that corresponds to t.
If $P(t) = \left(\frac{5}{13}, \frac{-12}{13}\right)$, find $P(-t+\pi)$



A. $\left(\frac{5}{13}, \frac{-12}{13}\right)$

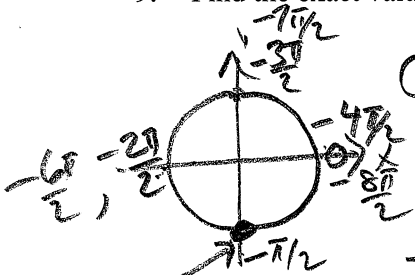
B. $\left(\frac{-5}{13}, \frac{-12}{13}\right)$

C. $\left(\frac{-5}{13}, \frac{12}{13}\right)$

D. $\left(\frac{5}{13}, \frac{12}{13}\right)$

E. None of the above

9. Find the exact value of $\sec\left(\frac{-13\pi}{2}\right)$



Count $-\frac{\pi}{2}$ 13 times
Starting At 0 And
going clockwise

$\cos\frac{-13\pi}{2} = 0$

$\sec\frac{-13\pi}{2} = \text{undefined}$

$-\frac{13\pi}{2}$

A. –2

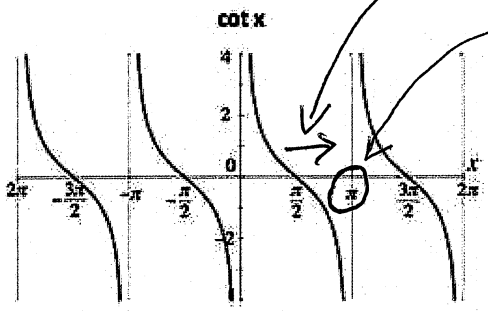
B. 1

C. 0

D. –1

E. None of the above

10. Use the graph to complete the statement: As $x \to \pi^-$, $\cot(x) \to$ _____



As $x \to \pi$ From the Left, $\cot(\theta)$ is going towards $-\infty$

A. $-\infty$

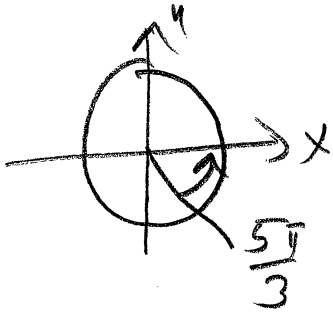
B. 0

C. 1

D. ∞

E. None of the above

11. Find the reference angle θ_R if $\theta = \frac{5\pi}{3}$



$\theta_R = 2\pi - \frac{5\pi}{3}$

$= \frac{6\pi}{3} - \frac{5\pi}{3}$

$= \pi/3$

A. $\theta_R = \frac{2\pi}{3}$

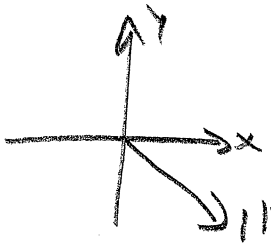
B. $\theta_R = \frac{-\pi}{3}$

C. $\theta_R = \frac{4\pi}{3}$

D. $\theta_R = \frac{\pi}{3}$

E. None of the above

12. Find the exact value of $\cos\left(\frac{11\pi}{6}\right)$.



$\theta_R = \frac{\pi}{6}$

$\cos\frac{\pi}{6} = \frac{\sqrt{3}}{2}$

$\cos\frac{11\pi}{6} = \frac{\sqrt{3}}{2}$

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

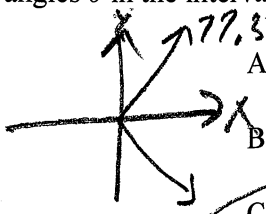
B. $\frac{\sqrt{3}}{2}$

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

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

E. None of the above

13. Approximate, to the nearest 0.1°, all angles θ in the interval [0°, 360°) that satisfy the equation $\sec\theta = 4.5387$.



A. $\theta = 77.3°, 102.7°$

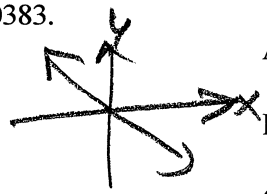
B. $\theta = 12.7°, 167.3°$

C. $\theta = 77.3°, 282.7°$

D. $\theta = 12.7°, 347.3°$

E. None of the above

14. Approximate, to the nearest 0.0001 radians, all angles θ in the interval $[0, 2\pi)$ that satisfy equation $\tan\theta = -1.0383$.



A. $\theta = 2.3374, 3.9458$

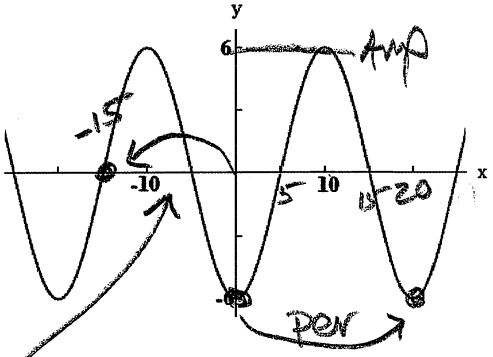
B. $\theta = 0.8042, 3.9458$

C. $\theta = 0.8042, 5.4790$

D. $\theta = 2.3374, 5.4790$

E. None of the above

Use the graph of the **sine** function to answer Questions 15, 16, and 17.



15. Find the amplitude

A. 6

B. −12

C. 12

D. −6

16. Find the period

A. 10

B. 15

C. 20

D. 5

17. Find the Phase Shift

A. −5

B. −15

C. −10

D. −20

Lessons 1-11, All of Sections 6.1, 6.2, 6.3, 6.4, 6.5.

Question	Answers	
1.	A	131°2'51"
2.	B	153.1433°
3.	D	$3.92\,km$
4.	A	6.4°
5.	C	$\cos\theta = \frac{b}{\sqrt{a^2+b^2}}$
6.	D	IV
7.	A	$\frac{-6}{\sqrt{61}}$
8.	B	$\left(\frac{-5}{13}, \frac{-12}{13}\right)$
9.	E	Undefined
10.	A	$-\infty$
11.	D	$\theta_R = \frac{\pi}{3}$
12.	B	$\frac{\sqrt{3}}{2}$
13.	C	$\theta = 77.3°, 282.7°$
14.	D	$\theta = 2.3374, 5.4790$
15.	A	6
16.	C	20
17.	B	−15