MA 15400

Spring 2013

Exam 1

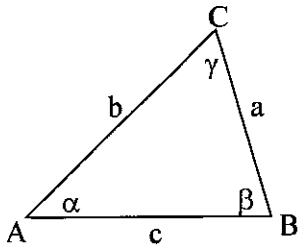
Solutions

PYTHAGOREAN IDENTITIES:

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

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

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



MA 15400 Exam 1 Spring 2013

Lessons 1-12, Sections 6.1, 6.2, 6.3, 6.4, 6.5, and 6.7 up to questions #31

1. Express $\theta = 3.25$ radians in terms of degrees, minutes, and seconds, to the nearest second.

$\left(\frac{3.25}{1}\right)\left(\frac{180^\circ}{\pi}\right) = 186.2113^\circ$

$0.2113^\circ \times 60' = 12.6770'$

$0.6770' \times 60'' = 40.62''$

$186^\circ 12' 41''$

A. 186° 21' 13"

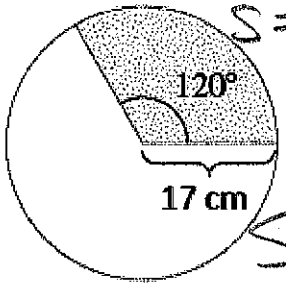
B. 186° 12' 41"

C. 186° 13' 41"

D. 186° 13' 40"

E. None of the above

2. Find the length of the arc of the colored sector. Round to the nearest tenth.



$S = r\theta$ ← (radians)

$\left(\frac{120^\circ}{1}\right)\left(\frac{\pi}{180^\circ}\right) = \frac{2\pi}{3} = \theta$

$S = 17\left(\frac{2\pi}{3}\right)$

$S = 35.6047$

A. 35.6 *cm*

B. 41.2 *cm*

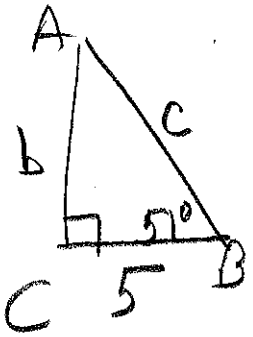
C. 39.8 *cm*

D. 45.6 *cm*

E. None of the above

3. Find the perimeter of triangle ABC with $\gamma = 90°$, $\beta = 51°$, and side $a = 5$. Round to one decimal place.

sec. 6.7 Lesson 12



$\tan 51^\circ = \frac{b}{5}$

$b = 5\tan 51^\circ = 6.1745$

$\cos 51^\circ = \frac{5}{c}$

$c = \frac{5}{\cos 51^\circ} = 7.9451$

$P = 5 + 6.1745 + 7.9451$

$P = 19.1196$

A. 22.9

B. 15.5

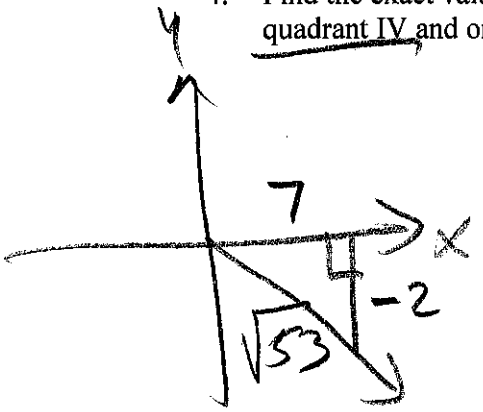
C. 18.6

D. 19.1

E. None of the above

Lessons 1-12, Sections 6.1, 6.2, 6.3, 6.4, 6.5, and 6.7 up to questions #31

4. Find the exact value of $\csc(\theta)$ if θ is in standard position and the terminal side of θ is in quadrant IV and on the line $2x + 7y = 0$.



$7y = -2x$

$y = -\frac{2}{7}x$

$m = -\frac{2}{7}$

$\therefore \tan\theta = -\frac{2}{7}$

$\sin\theta = -\frac{2}{\sqrt{53}}$

$\tan\theta = \frac{y}{x} = -\frac{2}{7}$

$\csc\theta = -\frac{\sqrt{53}}{2}$

$c^2 = 2^2 + 7^2$

$c = \sqrt{53}$

A. $\csc(\theta) = \frac{-\sqrt{53}}{7}$

B. $\csc(\theta) = \frac{\sqrt{53}}{7}$

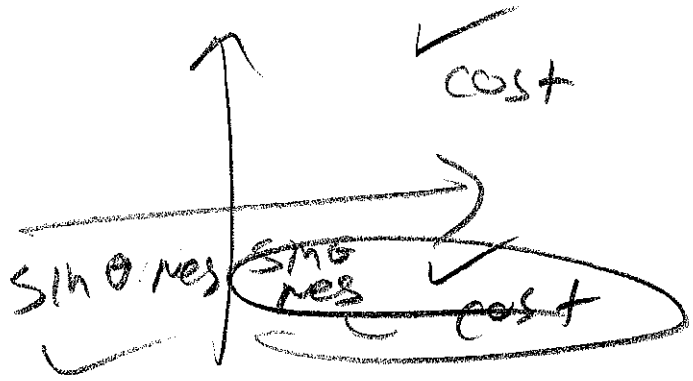
C. $\csc(\theta) = \frac{-\sqrt{53}}{2}$

D. $\csc(\theta) = \frac{\sqrt{53}}{2}$

E. None of the above

5. Find the quadrant containing θ if the given conditions are true.

$\cos(\theta) > 0$ and $\sin(\theta) < 0$



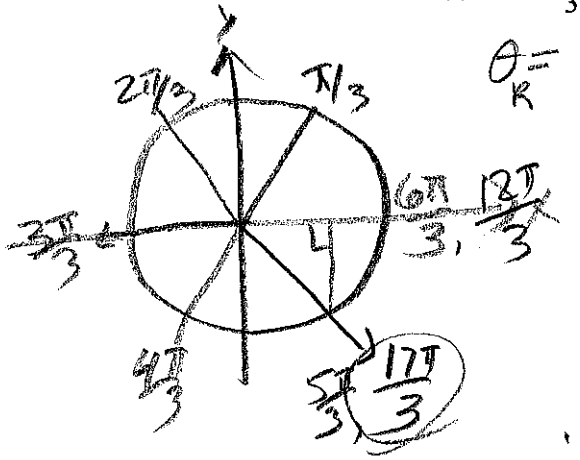
A. *QI*

B. *QII*

C. *QIII*

D. *QIV*

6. Let P be the point that corresponds to the intersection of the terminal side of angle t and the unit circle. Find $\cos(t)$ if $t=\frac{17\pi}{3}$.



$\theta_R = \pi/3$

$\cos\frac{\pi}{3} = \frac{1}{2}$

QIV cos θ is positive

$\therefore \cos\frac{17\pi}{3} = \frac{1}{2}$

A. $\cos(t)=\frac{1}{2}$

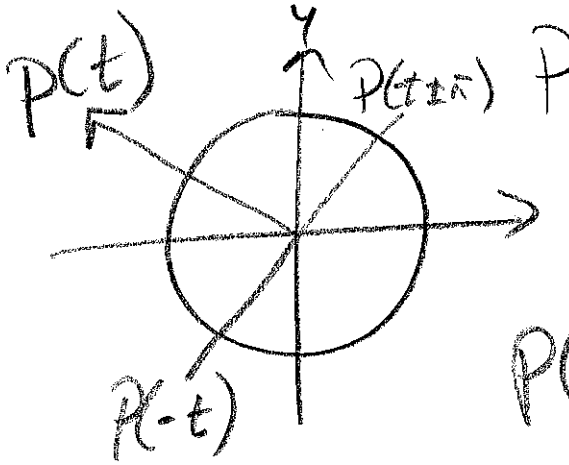
B. $\cos(t)=\frac{\sqrt{3}}{2}$

C. $\cos(t)=\frac{-1}{2}$

D. $\cos(t)=\frac{-\sqrt{3}}{2}$

E. None of the above

7. Let P be the point that corresponds to the intersection of the terminal side of angle t and the unit circle. If $P(t)=\left(\frac{-15}{17},\frac{8}{17}\right)$ find $P(-t+\pi)$.



$P(-t) = \left(\frac{-15}{17}, \frac{-8}{17}\right)$

$P(-t\pm\pi) = \left(\frac{15}{17}, \frac{8}{17}\right)$

A. $\left(\frac{-15}{17},\frac{-8}{17}\right)$

B. $\left(\frac{15}{17},\frac{-8}{17}\right)$

C. $\left(\frac{-15}{17},\frac{8}{17}\right)$

D. $\left(\frac{15}{17},\frac{8}{17}\right)$

E. None of the above

8. Which of the following is equivalent to $\dfrac{\cot x + \tan x}{\cot x}$?

$\dfrac{\frac{\cos\theta}{\sin\theta} + \frac{\sin\theta}{\cos\theta}}{\frac{\cos\theta}{\sin\theta}} = \dfrac{\frac{\cos^2\theta + \sin^2\theta}{\sin\theta\cos\theta}}{\frac{\cos\theta}{\sin\theta}}$

$\dfrac{1}{\sin\theta\cos\theta} \cdot \dfrac{\sin\theta}{\cos\theta} = \dfrac{1}{\cos^2\theta} = \sec^2\theta$

A. $\sin^2 x$

B. $\cos^2 x$

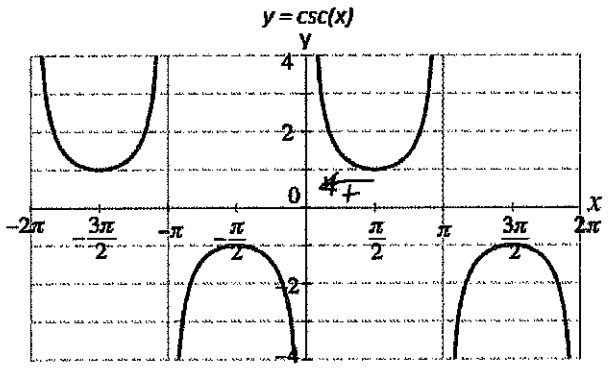
C. $\sec^2 x$

D. $\csc^2 x$

E. 1

9. using the graph of the $\csc(x)$ function, complete the following

$As\ x \to 0^+, \csc(x) \to$ QD



A. ∞

B. -1

C. $-\infty$

D. 1

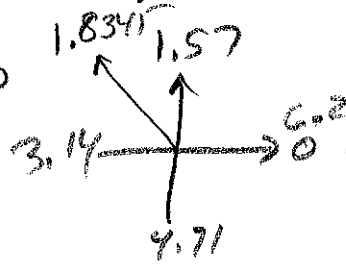
E. Undefined

10. Find the reference angle, θ_R, if $\theta = 52.1$. Round your answer to the nearest 0.01 radian.

$\dfrac{52.1}{2\pi} = 8.2920$

$52.1 - 8(2\pi) =$

$52.1 - 50.2655 = 1.8345$



$\theta_R = \pi - 1.8345 = 1.3071$

A. 1.41

B. 1.31

C. 1.21

D. 1.51

E. None of the above

Lessons 1-12, Sections 6.1, 6.2, 6.3, 6.4, 6.5, and 6.7 up to questions #31

11. Approximate, to the nearest 0.1°, all angles θ in the interval [0°, 360°) that satisfy the equation $\cot\theta = 2.3456$

$\frac{1}{\cot\theta} = \frac{1}{2.3456}$

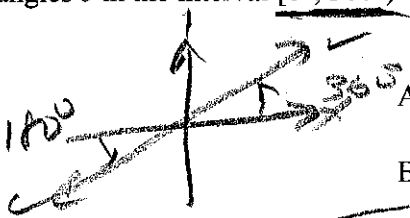
$\tan\theta = 0.4263$

$\theta = \tan(0.4263)$

$\theta_1 = 23.1°$

$\theta_2 = 180° + 23.1°$

$\theta_2 = 203.1°$



A. 16.1°,196.1°

B. 156.9°,336.9°

C. 23.1°,203.1°

D. 163.9°,343.9°

E. None of the above

12. Approximate, to the nearest 0.01 radian, all angles θ in the interval [0, 2π) that satisfy the equation $\sin\theta = -0.8765$.

$\theta = \sin^{-1}(-0.8765)$

$\theta = -1.0685$

$\theta_R = 1.0685$

$\theta_1 = \pi + 1.0685 = 4.21$

$\theta_2 = 2\pi - 1.0685 = 5.21$

A. 4.21,5.21

B. 2.07,4.21

C. 4.55,4.87

D. 1.73,4.55

E. None of the above

13. Find the period and the phase shift $y = 5\sin\left(2x - \frac{\pi}{3}\right)$

$Per = \frac{2\pi}{b}$

$Per = \frac{2\pi}{2} = \pi$

$P.S. = -\frac{c}{b}$

$= -\frac{-\pi/3}{2/1}$

$P.S. = \frac{\pi}{3}\cdot\frac{1}{2} = \frac{\pi}{6}$

A. *Period* $= 2\pi$, *Phase Shift* $= \frac{\pi}{6}$

B. *Period* $= 4\pi$, *Phase Shift* $= 2\pi$

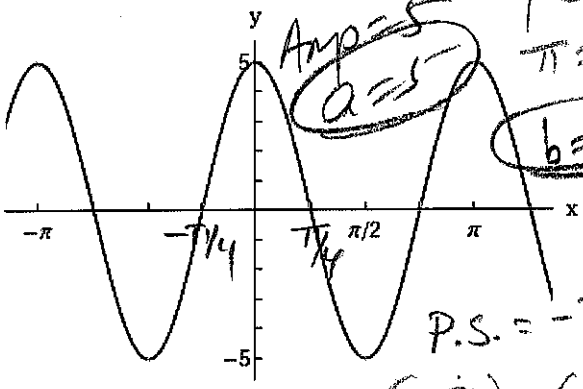
C. *Period* $= 2\pi$, *Phase Shift* $= -2\pi$

D. *Period* $= 4\pi$, *Phase Shift* $= \frac{-\pi}{6}$

E. None of the above

Lessons 1-12, Sections 6.1, 6.2, 6.3, 6.4, 6.5, and 6.7 up to questions #31

14. Write the equation in the form $y = a\sin(bx + c)$ for $a > 0$, $b > 0$, and the least positive real number c.



Per $= \pi$, Amp $= 5$, $a = 5$, $\pi = \frac{2\pi}{b}$, $b = 2$

P.S. $= -\pi/4$

$-2\left(-\frac{\pi}{4}\right) = \left(\frac{c}{2}\right)2$

$\frac{\pi}{2} = c$

A. $y = 5\sin\left(\frac{1}{2}x + \pi\right)$

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

C. $y = 5\sin\left(\frac{1}{2}x + \frac{\pi}{2}\right)$

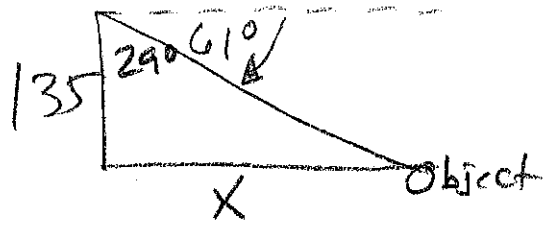
D. $y = 5\sin(2x + \pi)$

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

15. From a point 135 meters above level ground, a surveyor measures the **angle of depression** of an object on the ground at 61°. Approximate the distance from the object to the point on the ground directly beneath the surveyor. Round your answer to the nearest meter.

Lesson 12 Sec. 6.7

[Warning: Check the mode on your calculator!]



$90° - 61° = 29°$

A. 80 *meters*

B. 244 *meters*

C. 262 *meters*

D. 75 *meters*

E. None of the above

$\tan 29° = \frac{x}{135}$

$135 \tan 29° = x$

$x = 74.83$

	Exam 1 Answers
1.	B
2.	A
3.	D
4.	C
5.	D
6.	A
7.	D
8.	C
9.	A
10.	B
11.	C
12.	A
13.	E
14.	B
15.	D