Math 51 (9:30am – 10:20am) GREY
Midterm 1
Thu Apr 23, 2009

SCORE: ___ / 140 POINTS

What month is your birthday ? ___ ___
What are the first 2 digits of your address ? ___ ___
What are the last 2 digits of your zip code ? ___ ___
What are the last 2 digits of your social security number ? ___ ___
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NO CALCULATORS ALLOWED ON THIS SECTION

Fill in the following values. **SCORE: ___ / 6 POINTS**

[a] $\tan 45^\circ =$ 1 [b] $\cos 60^\circ =$ $\frac{1}{2}$ [c] $\csc 30^\circ =$ 2

[d] $\sin 60^\circ =$ $\frac{\sqrt{3}}{2}$ [e] $\cot 30^\circ =$ $\sqrt{3}$ [f] $\sec 45^\circ =$ $\sqrt{2}$

Complete the following table of values for the quadrantal angle -180°. **SCORE: ___ / 6 POINTS**

θ	$\sin\theta$	$\cos\theta$	$\tan\theta$	$\csc\theta$	$\sec\theta$	$\cot\theta$
-180°	0	-1	0	UNDEF	-1	UNDEF

MULTIPLE CHOICE: Which of the following statements is true ? **SCORE: ___ / 6 POINTS**

[a] $\sec 46^\circ < \sec 43^\circ$ [b] $\cot 46^\circ > \cot 43^\circ$ [c] $\sin 46^\circ < \cos 43^\circ$ [d] none of the above

LETTER OF CORRECT ANSWER: C

Find the six trigonometric function values for an angle in standard position with terminal side $4x+3y=0, \quad x \le 0$. **SHOW YOUR WORK.** **SCORE: ___ / 10 POINTS**

$4(-3)+3(4)=0$

$x=-3$

$y=4$

$r=\sqrt{(-3)^2+4^2}$

$=5$

$\sin\theta = \frac{4}{5}$ $\csc\theta = \frac{5}{4}$

$\cos\theta = -\frac{3}{5}$ $\sec\theta = -\frac{5}{3}$

$\tan\theta = -\frac{4}{3}$ $\cot\theta = -\frac{3}{4}$

Use an identity **(NOT x, y and r)** to find $\sec\theta$ if $\tan\theta = 6$ and $\csc\theta < 0$. **SHOW YOUR WORK.** **SCORE: ___ / 6 POINTS**

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

$= 37$

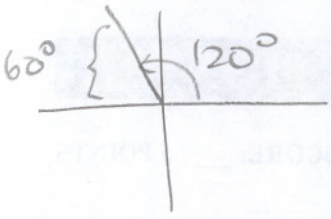
$\sec\theta = \pm\sqrt{37}$

θ IN $Q_3 \Rightarrow \sec\theta < 0$

$\sec\theta = -\sqrt{37}$

Find the six trigonometric function values for $840°$. **SHOW YOUR WORK.** SCORE: ___ / 10 POINTS

$840° - 360° * 2 = 120°$ IN Q_2



$\sin\theta = \frac{\sqrt{3}}{2}$ $\quad \csc\theta = \frac{2\sqrt{3}}{3}$

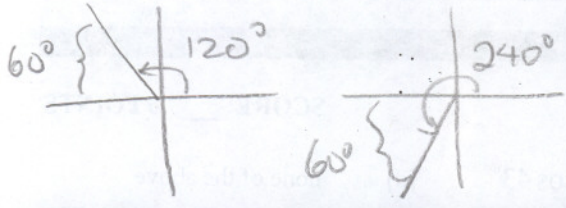
$\cos\theta = -\frac{1}{2}$ $\quad \sec\theta = -2$

$\tan\theta = -\sqrt{3}$ $\quad \cot\theta = -\frac{\sqrt{3}}{3}$

Find all values of θ in $[0°, 360°]$ such that $\cos\theta = -\frac{1}{2}$. **SHOW YOUR WORK.** SCORE: ___ / 10 POINTS

REF ANGLE = $60°$

θ IN Q_2 OR Q_3



$\theta = 120°$ OR $240°$

Find one solution for the equation $\tan(3\alpha + 20°) = \cot(2\alpha - 10°)$. **SHOW YOUR WORK.** SCORE: ___ / 10 POINTS

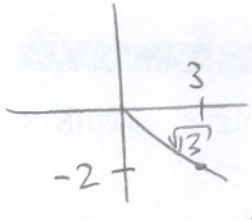
$3\alpha + 20° = 90° - (2\alpha - 10°)$

$3\alpha + 20° = 100 - 2\alpha$

$5\alpha = 80°$

$\alpha = 16°$

Find the five remaining function values of θ if $\cot\theta = -\frac{3}{2}$ and θ is in quadrant IV. **SHOW YOUR WORK.** SCORE: ___ / 10 POINTS



$x = 3$ $\quad y = -2$

$r = \sqrt{3^2 + (-2)^2} = \sqrt{13}$

$\sin\theta = -\frac{2\sqrt{13}}{13}$ $\quad \csc\theta = -\frac{\sqrt{13}}{2}$

$\cos\theta = \frac{3\sqrt{13}}{13}$ $\quad \sec\theta = \frac{\sqrt{13}}{3}$

$\tan\theta = -\frac{2}{3}$

SUBMIT THIS SECTION BEFORE YOU PICK UP YOUR CALCULATOR

Math 51 (~~7~~:30am – ~~8~~:20am) PINK
Midterm 1
Thu Apr 23, 2009

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CALCULATORS ALLOWED ON THIS SECTION

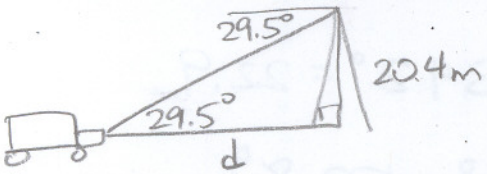
Convert 73.3907° to degrees, minutes and seconds. **SHOW YOUR WORK.** **SCORE: ___ / 5 POINTS**

$73^\circ + 0.3907 * 60' = 73^\circ 23.442'$
$= 73^\circ 23' + 0.442 * 60''$
$= 73^\circ 23' 26.52''$

Find $\csc 76^\circ 54' 32''$ to 4 decimal places. **SHOW WHAT YOU TYPED IN YOUR CALCULATOR.** **SCORE: ___ / 4 POINTS**

$$\frac{1}{\sin\left(76 + \frac{54}{60} + \frac{32}{3600}\right)} = 1.0267$$

The angle of depression from the top of a $20.4m$ tall television tower to a utility truck is 29.5°. How far is the truck from the tower ? **SHOW YOUR WORK.** **SCORE: ___ / 12 POINTS**

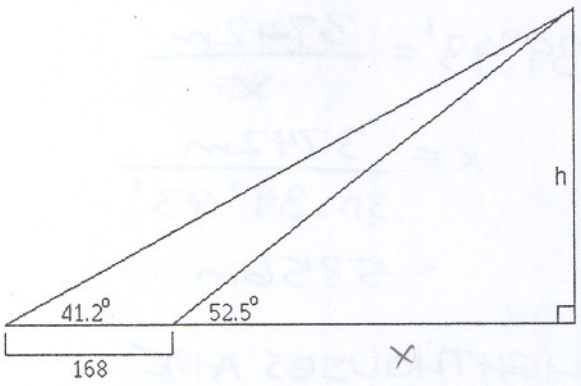


$\tan 29.5^\circ = \frac{20.4\,m}{d}$

$d = \frac{20.4\,m}{\tan 29.5^\circ} = 36.1\,m$

THE TRUCK IS 36.1m FROM THE TOWER

Find h in the diagram. **SHOW YOUR WORK.** **SCORE: ___ / 12 POINTS**



$\tan 52.5^\circ = \frac{h}{x} \Rightarrow h = x \tan 52.5^\circ$

$\tan 41.2^\circ = \frac{h}{x+168} \Rightarrow h = (x+168)\tan 41.2^\circ$

$x \tan 52.5^\circ = (x+168)\tan 41.2^\circ$

$x \tan 52.5^\circ = x \tan 41.2^\circ + 168 \tan 41.2^\circ$

$x \tan 52.5^\circ - x \tan 41.2^\circ = 168 \tan 41.2^\circ$

$x(\tan 52.5^\circ - \tan 41.2^\circ) = 168 \tan 41.2^\circ$

$x = \frac{168 \tan 41.2^\circ}{\tan 52.5^\circ - \tan 41.2^\circ}$

$h = \frac{168 \tan 41.2^\circ \tan 52.5^\circ}{\tan 52.5^\circ - \tan 41.2^\circ} = 448$

Find the least positive measure of an angle coterminal with -2937°. **SHOW YOUR WORK.** **SCORE: ___ / 4 POINTS**

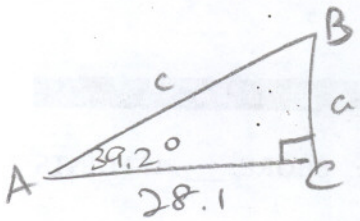
$-2937^\circ + 360^\circ * 9 = 303^\circ$

Find a value of θ in $[0^\circ, 90^\circ]$ such that $\cot\theta = 2.7$. Round your answer to 4 decimal places. **SHOW WHAT YOU TYPED IN YOUR CALCULATOR.** **SCORE: ___ / 5 POINTS**

$\tan\theta = \frac{1}{2.7}$

$\theta = \tan^{-1}\frac{1}{2.7} = 20.3231^\circ$

Solve the right angle triangle ABC if $C = 90.0^\circ$, $A = 39.2^\circ$ and $b = 28.1$. **SHOW YOUR WORK.** **SCORE: ___ / 12 POINTS**



$\cos 39.2^\circ = \frac{28.1}{c}$

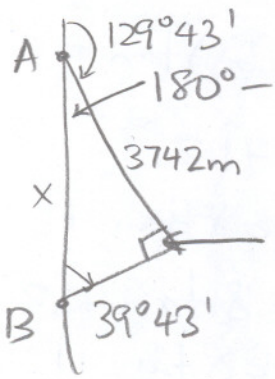
$c = \frac{28.1}{\cos 39.2^\circ} = 36.3$

$\tan 39.2^\circ = \frac{a}{28.1}$

$a = 28.1 \tan 39.2^\circ = 22.9$

$B = 90^\circ - 39.2^\circ = 50.8^\circ$

Two lighthouses are located on a north-south line. From lighthouse A, the bearing of a ship $3742m$ away is $129^\circ 43'$. From lighthouse B, the bearing of the ship is $39^\circ 43'$. Find the distance between the lighthouses. **SHOW YOUR WORK.** **SCORE: ___ / 12 POINTS**



$180^\circ - 129^\circ 43' = 50^\circ 17'$

$180^\circ - (50^\circ 17' + 39^\circ 43')$

$= 180^\circ - 90^\circ$

$= 90^\circ$

$\sin 39^\circ 43' = \frac{3742m}{x}$

$x = \frac{3742m}{\sin 39^\circ 43'}$

$= 5856m$

THE LIGHTHOUSES ARE 5856m APART