Test Review
FRQ 1
Calculator NOT Permitted

Suppose that an angle, θ, in standard position is such that $\sin\theta = -\frac{3}{5}$ and that a separate angle, $\alpha = -\frac{4\pi}{5}$ radians. Answer the following questions.

a. In what quadrant(s) could angle θ terminate? Explain your reasoning.

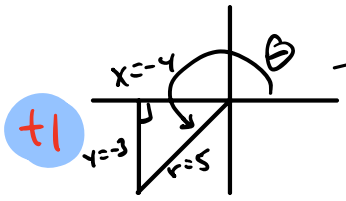
$\sin\theta = \frac{y}{r} = -\frac{3}{5} < 0$, so θ terminates below x-axis. +1

∴ θ terminates in Quad III or IV +1

b. If angle θ is also such that sec θ < 0, find the values of tan θ and cot θ. Draw and label the reference triangle for θ.

$\sec\theta = \frac{r}{x} < 0$ ∴ θ terminates to the left of y-axis

∴ θ terminates in QUAD III.



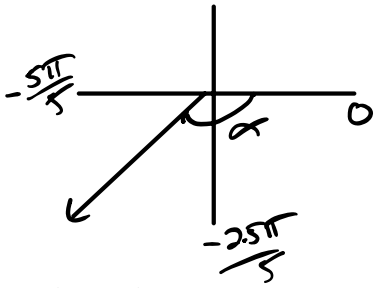
PT 3-4-5 +1

$\tan\theta = \frac{y}{x} = \frac{-3}{-4} = \frac{3}{4}$ +1

$\cot\theta = \frac{x}{y} = \frac{4}{3}$ +1

c. In what quadrant does angle α terminate? Explain your reasoning.

$\alpha = -\frac{4\pi}{5}$



+1 $-\pi < -\frac{4\pi}{5} < -\pi/2$ +1 ∴ α terminates in QUAD III.

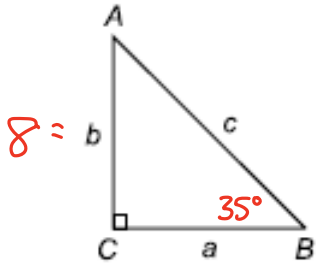
d. Find a positive co-terminal angle and the reference angle for angle α. Leave your answers in radian measure.

Coterminal $= -\frac{4\pi}{5} + \frac{10\pi}{5} = \frac{6\pi}{5}$ +1

Reference $\angle = \frac{\pi}{5}$ +1

MULTIPLE CHOICE – Calculator Permitted

1. If $b = 8$ and the measure of angle B is 35°, what is the value of c?



A. 4.598
B. 6.553
C. 9.766
D. 11.425
E. 13.948

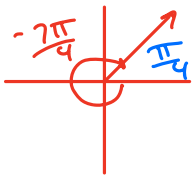
$\sin(35°) = \frac{8}{c}$

$c = \frac{8}{\sin(35°)}$

$c \approx 13.948$

2. Which of the following angles is co-terminal with the angle $\theta = -\frac{7\pi}{4}$.

A. $\frac{17\pi}{4}$ B. $\frac{3\pi}{4}$ C. $\frac{19\pi}{4}$ D. $\frac{11\pi}{4}$ E. $\frac{7\pi}{4}$



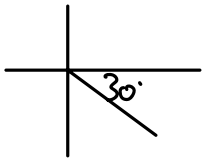
$\frac{17\pi}{4} - \frac{8\pi}{4} \Rightarrow \frac{9\pi}{4} - \frac{8\pi}{4} = \frac{\pi}{4}$

3. Which of the following angles in degrees represents θ', the reference angle, for the angle, θ, which measures $-\frac{13\pi}{6}$ radians?

Always +

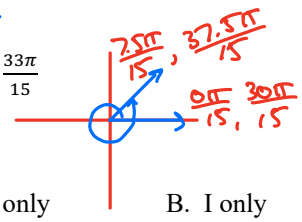
A. -30°
B. -45°
C. -60°
D. 30°
E. 60°

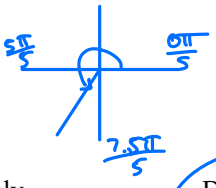
$-\frac{13\pi}{6} + \frac{12\pi}{6} = -\frac{\pi}{6} \Rightarrow -30°$

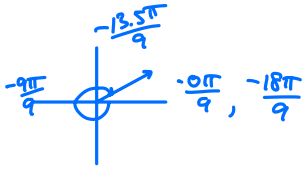


4. Which of the following angles would terminate in Quadrant I?

I. $\frac{33\pi}{15}$ ✓ II. $\frac{7\pi}{5}$ ✗ III. $-\frac{17\pi}{9}$ ✓



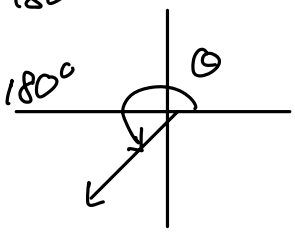




A. I and II only B. I only C. II only D. I and III only E. I, II, and III

5. Which of the following statements is/are true about the angle θ?

Ref = θ - 180°



I. If θ is such that 180° < θ < 270°, then the reference angle would equal (180° – θ).

II. If cos θ < 0, then the angle θ can terminate in either Quadrant II or Quadrant III.

III. If sin θ < 0 and tan θ < 0, then the angle θ will terminate in Quadrant II. IV

x < 0 y < 0 x & y opposite signs

A. I only B. II only C. III only D. I and II only E. II and III only

6. Which of the following angles in radian measure is/are larger than 135°?

$135° \cdot \frac{\pi}{180} = \frac{3\pi}{4} = .75\pi$

I. $\frac{5\pi}{6}$ .883π

II. $\frac{15\pi}{16}$ .9375π

III. $\frac{2\pi}{3}$ .6667π

A. II only B. I and II only C. III only D. II and III only E. I only

7. Find two values of θ that satisfy csc θ = 1.22077 on the interval [0°, 360°).

y > 0

A. 55° and 125°

B. 35° and 145°

C. 125° and 235°

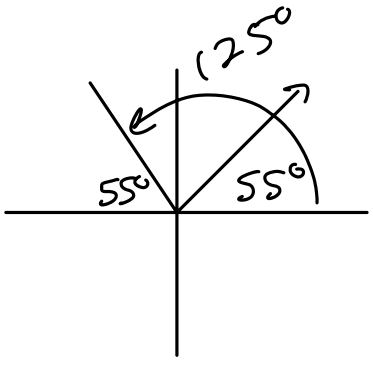
D. 235° and 305°

E. 55° and 305°

$\sin\theta = \frac{1}{1.22077}$

$\theta = \sin^{-1}\left(\frac{1}{1.22077}\right)$

$\theta = 55°$

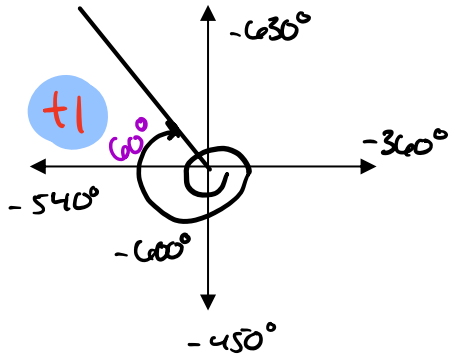


FRQ 2
Calculator Permitted

Consider the two angles, θ and α, to answer the questions that follow. The angle $\theta = -\frac{10\pi}{3}$ and α is such that $\sin\alpha = -\frac{3}{7}$.

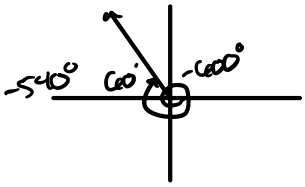
a. Express θ in terms of degree measure. Draw θ in standard degree position.

$\theta = \frac{-10\pi}{3} \cdot \frac{180^\circ}{\pi} = -600^\circ$ +1



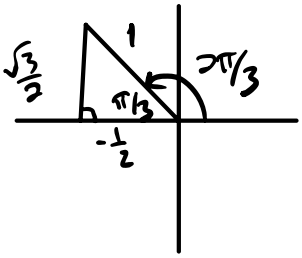
b. What is the measure of θ', the reference angle of θ, expressed in radian measure.

$\theta' = 60^\circ \cdot \frac{\pi}{180^\circ} = \frac{\pi}{3}$ +1



c. The angle θ is co–terminal with which angle on the unit circle? Using the correct coordinates, find the exact values of tan θ and csc θ. Show your work.

θ is coterminal with $\frac{2\pi}{3}$ on unit circle +1

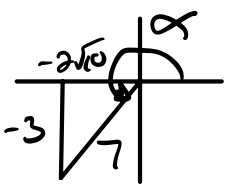


$\tan\theta = \frac{y}{x} = \frac{\frac{\sqrt{3}}{2}}{\frac{-1}{2}} \cdot \frac{2}{2} = \frac{\sqrt{3}}{-1} = -\sqrt{3}$ +1

$\csc\theta = \frac{r}{y} = \frac{1}{\frac{\sqrt{3}}{2}} \cdot \frac{2}{2} = \frac{2}{\sqrt{3}} = \frac{2\sqrt{3}}{3}$ +1

d. If cos α < 0, then which has a greater value — csc θ or tan α. Show and explain the analysis that leads to your answer.

+1
$\sin\alpha = \frac{y}{r} = \frac{-3}{7} < 0$ ∴ α terminates below x-axis.
$\cos\alpha = \frac{x}{r} < 0$ ∴ α terminates left of y-axis
∴ α terminates in QUAD III.



$x^2 + y^2 = r^2$
$x^2 + (-3)^2 = (7)^2$
$x^2 + 9 = 49$
$x^2 = 40$
$x = \pm\sqrt{40}$
$x = -2\sqrt{10}$

$\csc\theta = \frac{2\sqrt{3}}{3} \approx 1.155$

$\tan\alpha = \frac{-3}{-2\sqrt{10}} = \frac{3}{2\sqrt{10}} \approx 0.474$ +1

$\csc\theta > \tan\alpha$ +1

FRQ 3
Calculator Permitted

Suppose an angle θ is such that sec $\theta = -2.325$ and θ is such that $0 < \theta \leq 2\pi$.

a. If two angles have the same cosine value, what must be true about the reference angles of the two angles? From the unit circle, give an examples and explain your reasoning.

If two angles have the same cosine value, the angles must have the same reference angles and must terminate in Quad I and IV or Quad II and III. +1

$\alpha = \frac{\pi}{3}$ and $\beta = \frac{5\pi}{3}$ $\therefore \cos\left(\frac{\pi}{3}\right) = \frac{1}{2}$ and $\cos\left(\frac{5\pi}{3}\right) = \frac{1}{2}$ +1

b. In which quadrant(s) could θ terminate? Explain your reasoning.

$\sec\theta = -2.325 = \frac{r}{x} < 0$ $\therefore \theta$ terminates left of y-axis

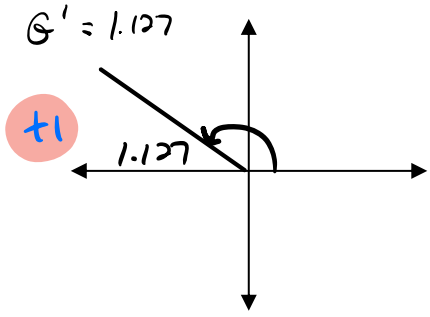
+1 +1

c. Using a calculator, solve the equation for θ and draw the angle your calculator gave you in standard position.

$\cos\theta = \frac{-1}{2.325}$

$\theta = \cos^{-1}\left(\frac{-1}{2.325}\right)$

$\theta = 2.015$ +1



+1

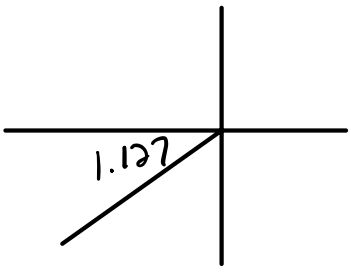
+1

$\theta = \pi - 1.127 \approx 2.014$

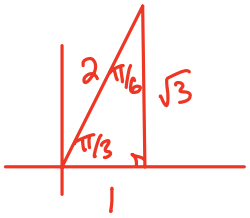
d. Find the other possible angle for θ that your calculator did not give you. Explain your method.

The other version of θ terminates in Quad III with a reference angle of 1.127. +1

$\theta = \pi + 1.127 \approx 4.269$ +1



MULTIPLE CHOICE – Calculator NOT Permitted

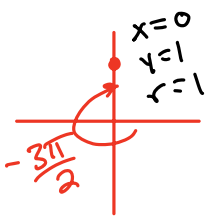


1. Using the coordinates on the unit circle, find the exact value of $\sin\frac{\pi}{3}$?

A. $\frac{\sqrt{3}}{3}$ B. $\sqrt{3}$ C. $\frac{\sqrt{3}}{2}$ D. 1 E. $\frac{1}{2}$

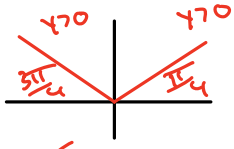
2. Using the coordinates on the unit circle, find the exact value of $\sec\left(-\frac{3\pi}{2}\right)$?

A. 1 B. –1 C. 0 D. $\frac{\sqrt{2}}{2}$ E. undefined

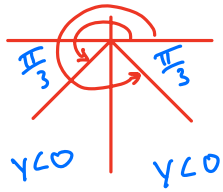


3. Which of the following pairs of trigonometric ratios are equivalent.

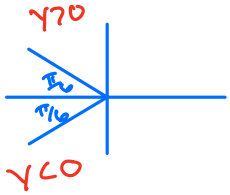
I. $\sin\frac{\pi}{4}, \sin\frac{3\pi}{4}$



II. $\sin\frac{4\pi}{3}, \sin\frac{5\pi}{3}$



III. $\sin\frac{5\pi}{6}, \sin\frac{7\pi}{6}$



A. II and III only
B. I and III only
C. III only
D. I only
E. I, II, and III only

4. In an oblique triangle, ΔABC, it is known that $a = 6$, $b = 8$, and $c = 9$. Which of the following equations could be solved to determine $m\angle B$?

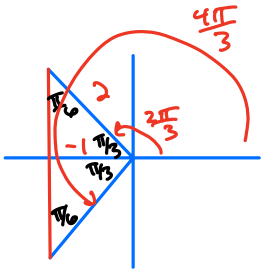
A. $6^2 = 9^2 + 8^2 - 2(9)(8)\cos B$
B. $8^2 = 9^2 + 6^2 - 2(9)(6)\sin B$
C. $9^2 = 6^2 + 8^2 - 2(6)(8)\cos B$
D. $6^2 = 8^2 + 9^2 - 2(8)(9)\sin B$
E. $8^2 = 9^2 + 6^2 - 2(9)(6)\cos B$

5. Which of the following angles, θ, is/are such that $\cos\theta = -\frac{1}{2}$.

I. $\theta = \frac{4\pi}{3}$ ✓ II. $\theta = \frac{2\pi}{3}$ ✓ III. $\theta = -\frac{\pi}{3}$ ✗

$x < 0$ QUAD III

A. I and II only
B. II only
C. II and III only
D. III only
E. I, II, and III



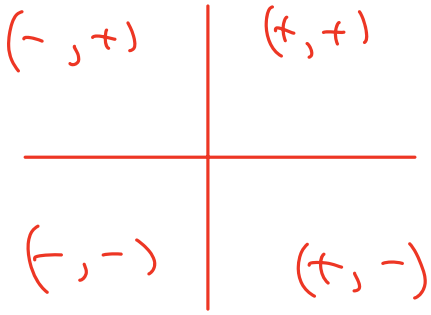
6. Which of the following statement(s) is/are true about the six trigonometric ratios?

I. In quadrant IV, the sine ✓ and secant ✗ ratios are positive.

II. In quadrant III, the tangent ✓ and cotangent ✓ ratios are positive.

III. Sine ✗ and Cosine are the only trigonometric ratios that are positive in quadrant I. Tan, Cot,

A. I and II only
B. I only
C. I and III only
D. II only
E. I, II, and III



$y > 0$ x & y Same Signs

7. An angle θ is such that $\csc\theta > 0$ and $\tan\theta > 0$, in which quadrant must the terminal side of θ lie?

A. Quadrant I
B. Quadrant II
C. Quadrant III
D. Quadrant IV
E. The terminal side of θ lies on an axis, not in a Quadrant.