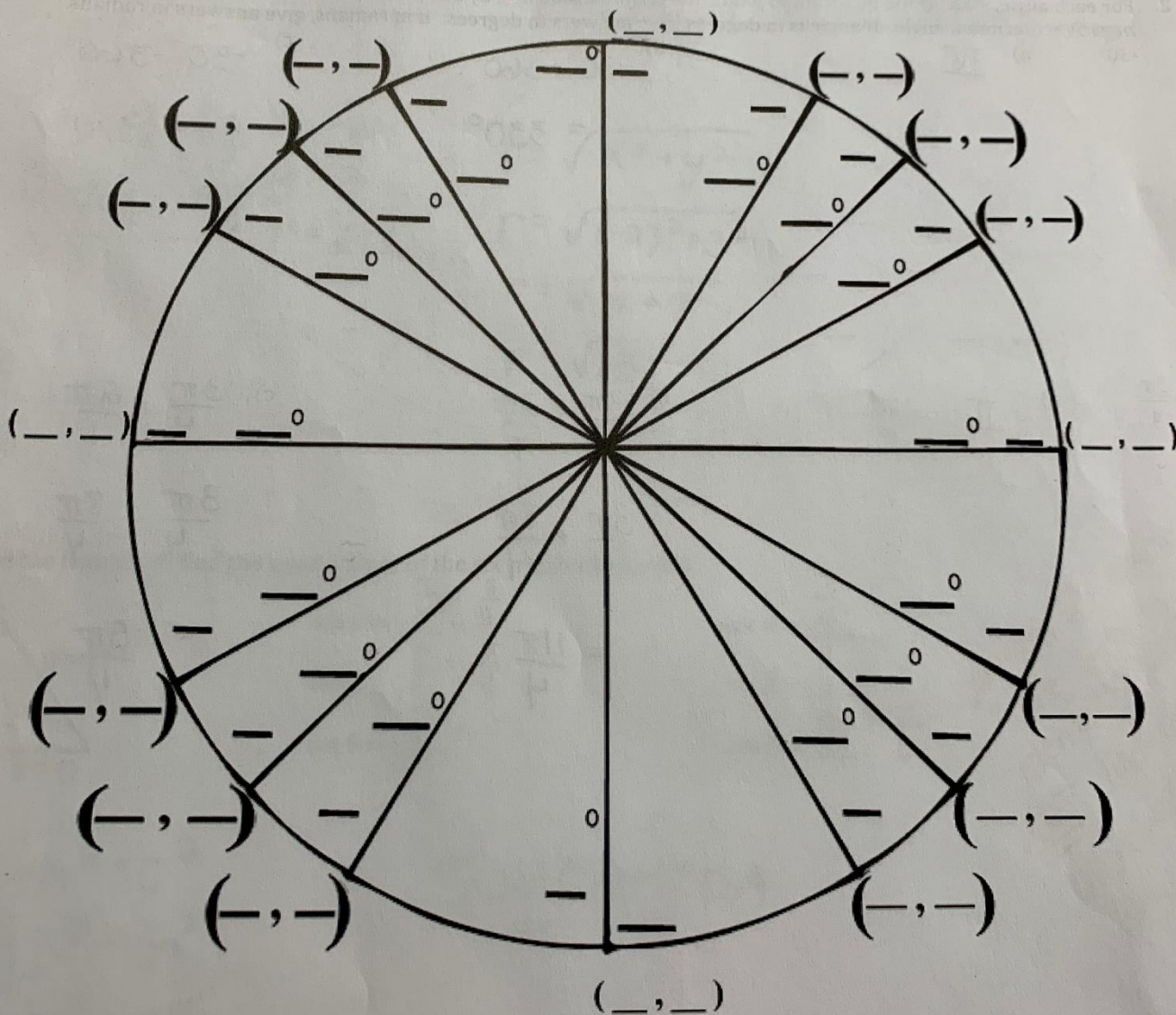


You will need to fill out the unit circle entirely, and it will be graded along with the rest of your test. The unit circle you fill out will be the one you reference to complete various problems on the remainder of the test, so it is crucial that you fill it out accurately! **NO CALCULATORS WILL BE PERMITTED FOR THE EXAM.** Therefore, all work must be shown.

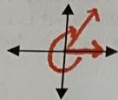
*** see filled in unit circle in Notes ***



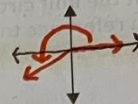
Show all your work. Keep your answers exact – simplified radical form – unless directed otherwise.

1. Sketch each angle in standard position.

a. -290°



b. 4 radians



2. For each angle, state a) the quadrant in which the terminal side lies, b) one *positive* coterminal angle, and c) one *negative* coterminal angle. If angle is in degrees, give answers in degrees. If in radians, give answers in radians.

-30°

a) IV

b) $-30^\circ + 360^\circ$
 $= 330^\circ$

c) $-30^\circ - 360^\circ$
 $= -390^\circ$

$\frac{3\pi}{4}$

a) II

b) $\frac{3\pi}{4} + \frac{2\pi}{1}$
 $\frac{3\pi}{4} + \frac{8\pi}{4}$
 $= \frac{11\pi}{4}$

c) $\frac{3\pi}{4} - \frac{2\pi}{1}$
 $\frac{3\pi}{4} - \frac{8\pi}{4}$
 $= -\frac{5\pi}{4}$

evaluate sine, cosine, and tangent for the angle in standard position whose terminal side contains the given point.

a) $(-3, 4)$
 $\sin \theta = \frac{y}{r} = \frac{4}{5}$
 $\cos \theta = \frac{x}{r} = \frac{-3}{5}$
 $\tan \theta = \frac{y}{x} = \frac{4}{-3}$

$$x = -3$$

$$y = 4$$

$$r = 5$$

$$r = \sqrt{x^2 + y^2}$$

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

$$r = \sqrt{9 + 16}$$

$$r = \sqrt{25} \quad r = 5 \text{ (positive bc it's a length)}$$

b) $(-2, 3)$
 $\sin \theta = \frac{y}{r} = \frac{3}{\sqrt{13}} \cdot \frac{\sqrt{13}}{\sqrt{13}} = \frac{3\sqrt{13}}{13}$
 $\cos \theta = \frac{x}{r} = \frac{-2}{\sqrt{13}} \cdot \frac{\sqrt{13}}{\sqrt{13}} = \frac{-2\sqrt{13}}{13}$
 $\tan \theta = \frac{y}{x} = \frac{3}{-2}$

$$x = -2$$

$$y = 3$$

$$r = \sqrt{13}$$

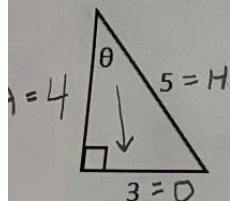
$$r = \sqrt{x^2 + y^2}$$

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

$$r = \sqrt{4 + 9}$$

$$r = \sqrt{13}$$

5. Use the triangle to find the exact values of the six trig functions of θ .



$$\sin \theta = \frac{O}{H} = \frac{3}{5}$$

$$\tan \theta = \frac{O}{A} = \frac{3}{4}$$

$$\cot \theta = \frac{A}{O} = \frac{4}{3}$$

$$\sec \theta = \frac{H}{O} = \frac{5}{3}$$

$$\csc \theta = \frac{H}{A} = \frac{5}{4}$$

$$\cos \theta = \frac{A}{H} = \frac{4}{5}$$

★ Notice that the 6 trig identities are NOT listed in order by reciprocal

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

$$3^2 + b^2 = 5^2$$

$$9 + b^2 = 25$$

$$b^2 = 16$$

$$b = 4$$

(positive bc it's a length)

SOHCAHTOA

6. Suppose θ is an angle in standard position. Under each of the given conditions, in which quadrant does the terminal side lie?

a) $\cos \theta < 0, \tan \theta < 0$

X is neg } Quad IV
and II }
Quad II, III

$\therefore$ Quad II

b) $\cos \theta > 0, \sin \theta < 0$

X is pos } y is neg
Quad I, IV } Quad III, IV

$\therefore$
Quad IV

★ MUST show conversions! cannot just use unit circle★

7. Convert the following radian measures to degrees.

a) $\frac{\pi}{9} \cdot \frac{180}{\pi}$

$= \frac{180\pi}{9\pi}$

$= 20^\circ$

b) $\frac{2\pi}{3} \cdot \frac{180}{\pi}$

$= \frac{360\pi}{3\pi}$

$= 120^\circ$

8. Convert the following degree measures to radians. Keep in terms of π .

a) $\frac{30^\circ}{1} \cdot \frac{\pi}{180}$

$= \frac{30\pi}{180}$

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

b) $\frac{-150^\circ}{1} \cdot \frac{\pi}{180}$

$= \frac{-150\pi}{180}$

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

Evaluate the 3 trig functions for each of the angles in standard position. No decimal approximations.

9. 60°

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

$\cos \theta = \frac{1}{2}$

$\tan \theta = \sqrt{3}$

10. -210°

$\sin \theta = \frac{1}{2}$

$\cos \theta = -\frac{\sqrt{3}}{2}$

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

(coterminal to 150°)

11. π

$\sin \theta = 0$

$\cos \theta = -1$

$\tan \theta = 0$

13. $\frac{7\pi}{4}$

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

$\cos \theta = \frac{\sqrt{2}}{2}$

$\tan \theta = -1$