Popper RT2
Question1: Mark

Math 1330 Test 2 Review

Where: CASA – Look in your confirmation email

Time: 50 minutes

Number of questions and point distribution will be announced on CASA calendar.

What is covered? 4.1, 4.2, 4.3 and 4.4

What to bring? Cougar card

Make up Policy: NO MAKE-UPS!
Plan to be at the testing center 10-15 minutes before your scheduled time.
If you are late, then try to reschedule through your CASA account.
If you miss your test, you will get a zero for the test. Your Final exam score will replace ONE lowest score test grade.
No calculators allowed during the test!

How to study? 1) Make sure you understand the material covered on videos.
→ **2) Solve ALL problems on this review sheet. 3) Take practice test 2 BEFORE your test.**

1. Convert the following degree measures to radians.
   a. 120°
   b. 225°

$120^\circ \cdot \frac{\pi}{180} = \frac{12}{18}\pi = \frac{2\pi}{3}$

$225 \cdot \frac{\pi}{180} = \frac{5\pi}{4}$ rad.

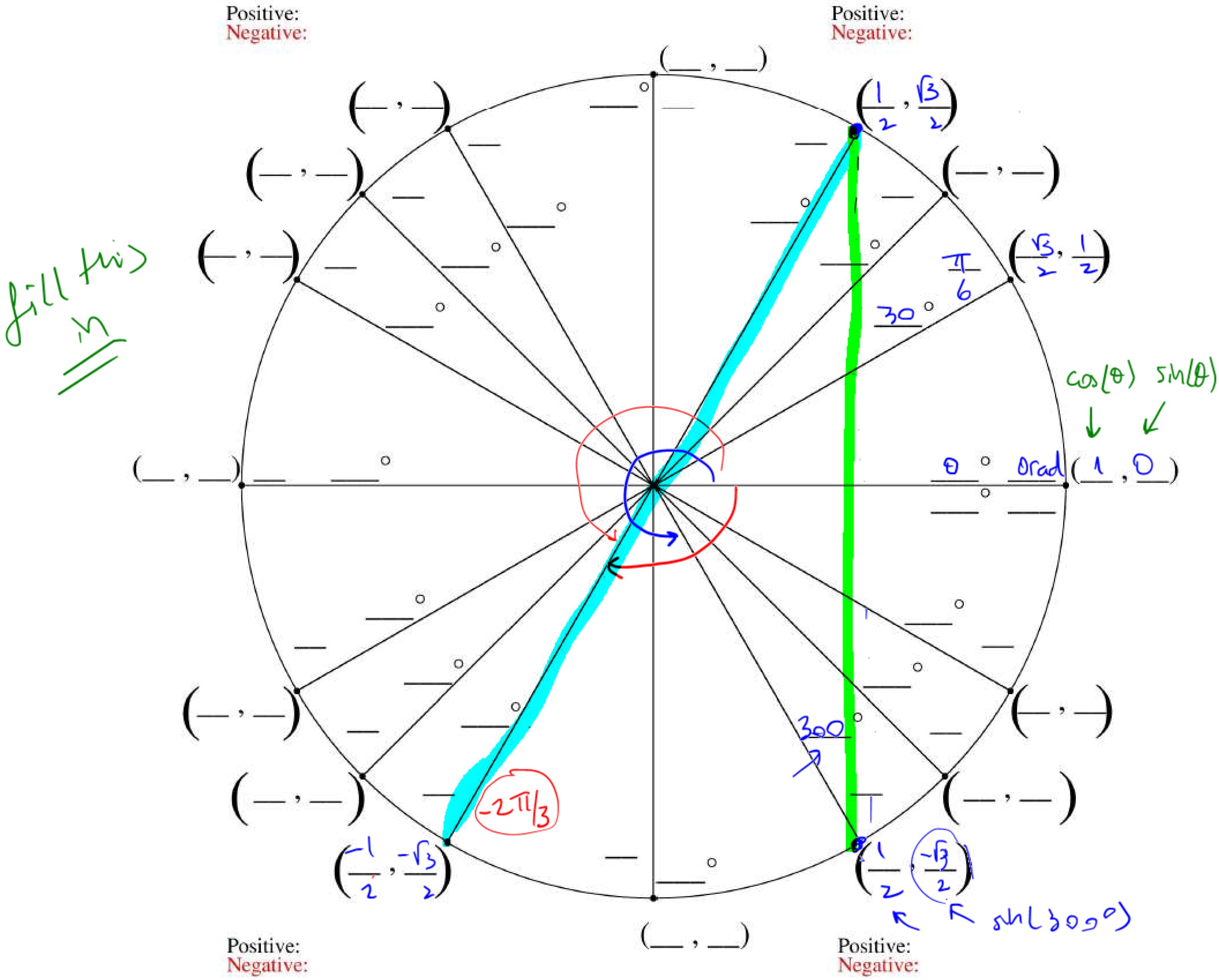
2. Convert the following radian measures to degrees.
   a. $\frac{5\pi}{6}$
   b. $\frac{61\pi}{36}$

$\frac{5\pi}{6} \cdot \frac{180}{\pi} = 150^\circ$

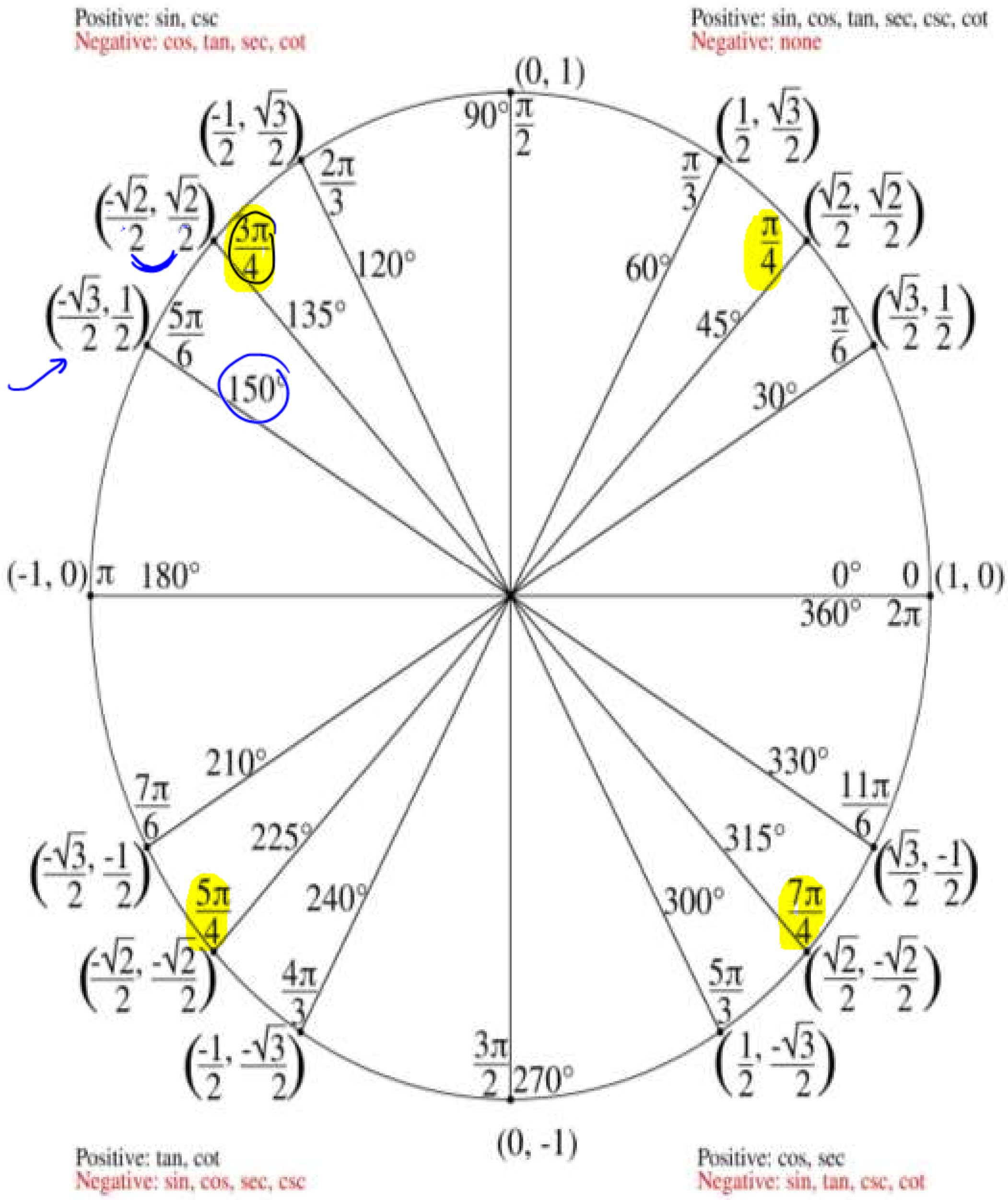
$\frac{61\pi}{36} \cdot \frac{180}{\pi} = 305^\circ$

KNOW YOUR UNIT CIRCLE!

Unit circle will not be provided; make sure you know it!



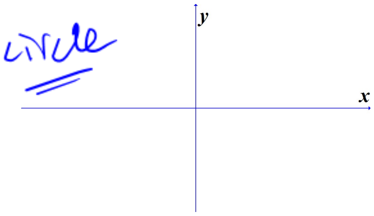
The Unit Circle



3. Evaluate the following if possible.

a. $\sin(300°)$ $= -\frac{\sqrt{3}}{2}$

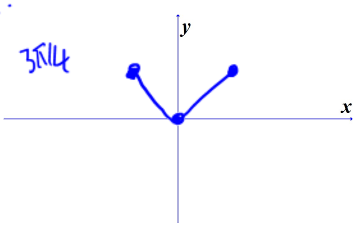
unit circle



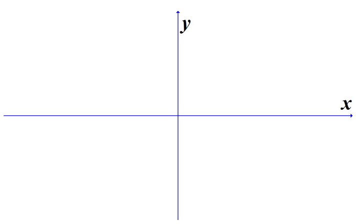
b. $\tan\left(\frac{3\pi}{4}\right)$ $= -1$

tan: −

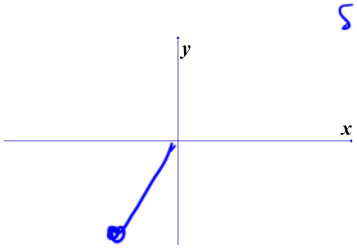
3π/4



c. $\sec(150°)$ $= \frac{1}{\cos(150°)} = \frac{1}{-\sqrt{3}/2} = -\frac{2}{\sqrt{3}} = \frac{-2\sqrt{3}}{3}$



d. $\csc\left(\frac{-2\pi}{3}\right)$ $= \frac{1}{\sin\left(-\frac{2\pi}{3}\right)} = \frac{1}{-\frac{\sqrt{3}}{2}} = -\frac{2}{\sqrt{3}} = \frac{-2\sqrt{3}}{3}$



$\left(-\frac{1}{2}, -\frac{\sqrt{3}}{2}\right)$

Q#2:

Mark

4. Mark all expressions that are undefined ("not a real number"):

$\sin(180^0) = 0$ $\qquad$ $\cos\left(90^0\right) = 0$

$\cot\left(\frac{\pi}{2}\right) = \frac{0}{1} = 0$ $\qquad$ * $\tan\left(90^0\right)$: undef. $\frac{1}{0}$

* $\tan\left(\frac{3\pi}{2}\right) = \frac{-1}{0}$ undef. $\qquad$ * $\cot\left(180^0\right) = \frac{-1}{0}$; undef

$\frac{\sin x}{\cos x} = \tan(x)$ $\qquad$ $\cot(x)$

inside $\neq \frac{\pi}{2}, \frac{3\pi}{2}, \frac{5\pi}{2}, \dots$ $\qquad$ $\neq 0, \pi, 2\pi, 3\pi, \dots$

$\sec(x) = \frac{1}{\cos(x)}$

$\csc(x) = \frac{1}{\sin(x)}$

5. A car has wheels with a 10-inch radius. If each wheel's rate of turn is 4 revolutions per second, how fast is the car moving in units of inches/sec?

$r = 10$

4 rot. per second

$\Rightarrow$ angular speed: $4 \cdot 2\pi = 8\pi$

linear speed $= r \cdot$ angular speed

$= 10 \cdot 8\pi = \boxed{80\pi}$

6. Find the area of the sector of a circle with central angle

a. $\theta = 225°$ and radius $r = 4\ ft$.

b. $\theta = \frac{5\pi}{3}$ and radius $r = 30\ in$.

Recall: $A = \frac{1}{2}r^2\theta$, θ is in radians!

a) $\theta = 225° \stackrel{\downarrow}{=} \frac{5\pi}{4}$ rad

$A = \frac{1}{2} \cdot 4^{\cancel{2}} \cdot \frac{5\pi}{\cancel{4}}$

$A = 10\pi$

$30 \cdot \cancel{30}^{10}$

$A = \frac{1}{2} \cdot 30^2 \cdot \frac{5\pi}{\cancel{3}}$

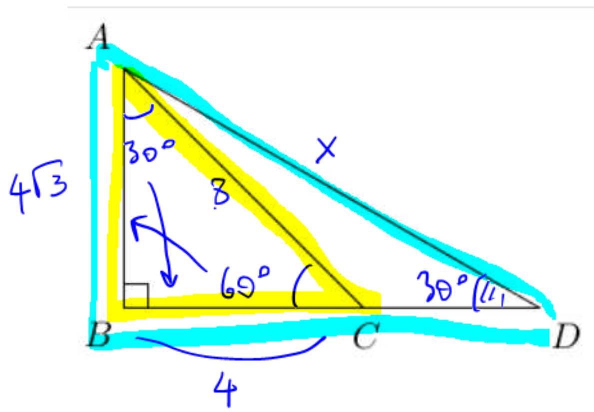
$A = \frac{1}{\cancel{2}} \cdot \cancel{300} \cdot 5\pi$

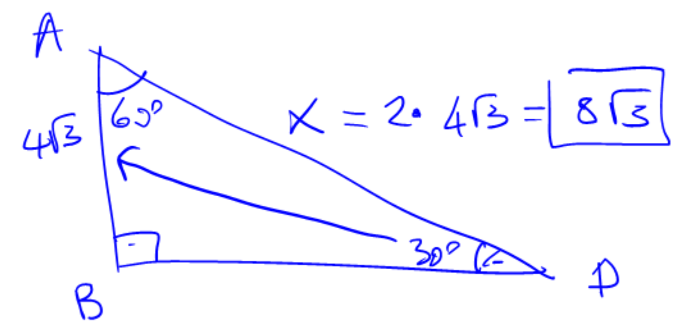
$\boxed{A = 750\pi}$

KNOW YOUR SPECIAL TRIANGLES! $30° - 60° - 90°$ $45° - 45° - 90°$

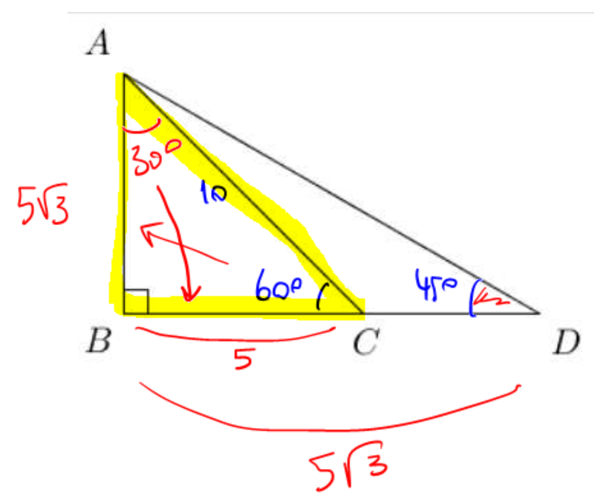
7.

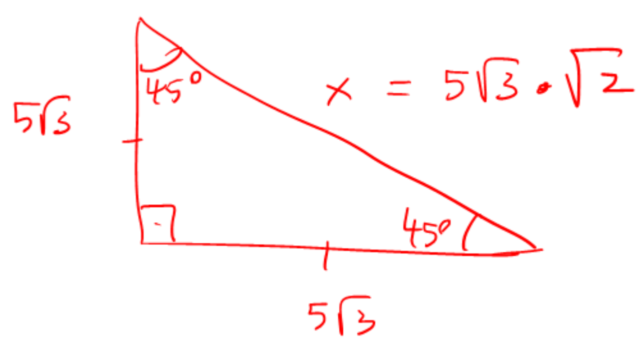
a. In the figure below, angle B is a right angle, $m(D) = 30°$ and $m(ACB) = 60°$. If $AC = 8$, find the length of AD.





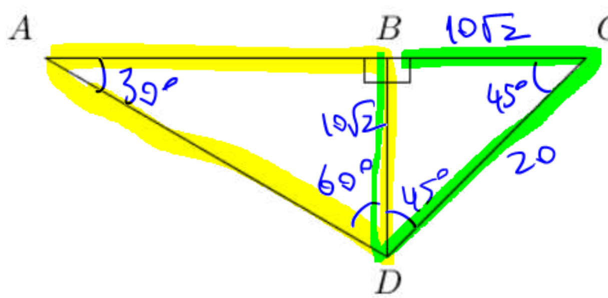
b. In the figure below, angle B is a right angle, $m(D) = 45°$ and $m(ACB) = 60°$. If $AC = 10$, find the length of AD.

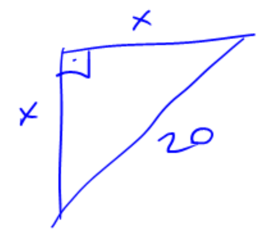




$\boxed{x = 5\sqrt{6}}$

c. In the figure below, segment BD is an altitude in triangle ADC, $m(A) = 30°$ and $m(C) = 45°$. If $CD = 20$, find the lengths of AB and AD.

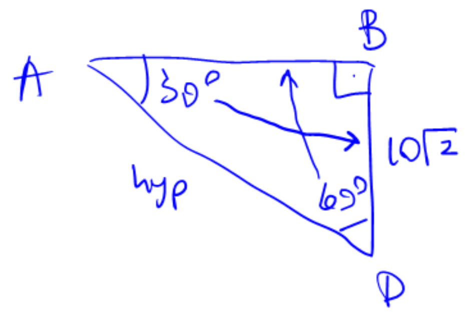




$x \cdot \sqrt{2} = 20$

$x = \frac{20}{\sqrt{2}}$

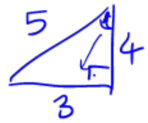
$x = \frac{20\sqrt{2}}{2} = 10\sqrt{2}$



$AD = 2 \cdot 10\sqrt{2} = 20\sqrt{2}$

$AB = 10\sqrt{2} \cdot \sqrt{3} = 10\sqrt{6}$

famous triangles: 3-4-5 5-12-13 8-15-17



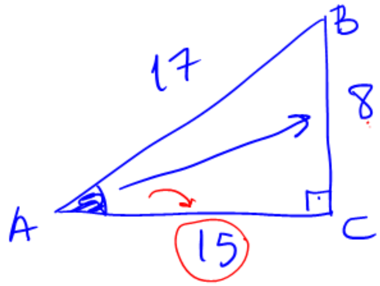
KNOW TRIANGLE FACTS!

- The **sum of the three angles** of a triangle add up to 180°.
- **If one side of a triangle is longer** than another **side**, then the angle opposite the **longer side** will have a **greater** degree measure than the angle opposite the **shorter side**.
- Pythagorean theorem: $a^2 + b^2 = c^2$

8. In right tringle ABC, the sides have length 8, 15 and 17. If A is the smallest angle, find cos(A) and tan(A).

hyp.

faces shortest side

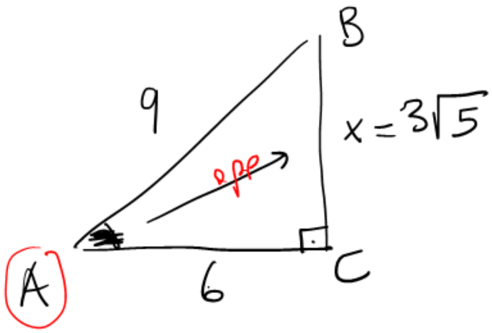


$$\cos(A) = \frac{adj}{hyp} = \frac{15}{17}$$

$$\tan(A) = \frac{opp}{adj} = \frac{8}{15}$$

SOH - CAH - TOA

9. Given a triangle ABC with right angle C, $AC = 6$ and $AB = 9$. Find all six trigonometric functions of angle A.



Pyth. thm: $x^2 + 6^2 = 9^2$

$x^2 + 36 = 81$

$x^2 = 81 - 36 = 45$

$x = \sqrt{45} = 3\sqrt{5}$

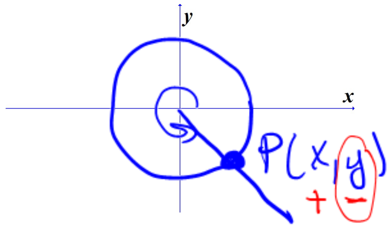
$\sin(A) = \frac{opp}{hyp} = \frac{3\sqrt{5}}{9} = \frac{\sqrt{5}}{3}$ $\xrightarrow{\text{flip}}$ $\csc(A) = \frac{3}{\sqrt{5}} = \frac{3\sqrt{5}}{5}$

$\cos(A) = \frac{adj}{hyp} = \frac{6}{9} = \frac{2}{3}$ $\xrightarrow{\text{flip}}$ $\sec(A) = \frac{3}{2}$

$\tan(A) = \frac{opp}{adj} = \frac{3\sqrt{5}}{6} = \frac{\sqrt{5}}{2}$ $\xrightarrow{\text{flip}}$ $\cot(A) = \frac{2}{\sqrt{5}} = \frac{2\sqrt{5}}{5}$

Q#3: Mark

10. Let $P(x, y)$ denote the point where the terminal side of an angle θ meets the unit circle. If P is in Quadrant IV and $x = \frac{4}{5}$, evaluate the six trigonometric functions of θ.



$P\left(\frac{4}{5}, y\right)$ $\boxed{x^2 + y^2 = 1}$

$\left(\frac{4}{5}\right)^2 + y^2 = 1$

$y^2 = 1 - \frac{16}{25} = \frac{9}{25}$

$\Rightarrow \quad y = \pm\sqrt{\frac{9}{25}}$

Since P is in Q4,

write $y = -\sqrt{\frac{9}{25}} = -\frac{3}{5}$

$P\left(\frac{4}{5}, -\frac{3}{5}\right)$

$\sin\theta = -\frac{3}{5}$

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

$\tan\theta = \frac{y}{x} = \frac{-3/5}{4/5} = -\frac{3}{4}$

$\csc\theta = -\frac{5}{3}$

$\sec\theta = \frac{5}{4}$

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

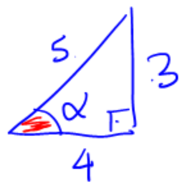
3-4-5

θ: Quad. 3

11. a) Given $\cos\theta = -\frac{4}{5}$ and $\tan\theta > 0$, find $\csc\theta$. $= \frac{1}{\sin\theta} = \frac{1}{-\frac{3}{5}} = \boxed{-\frac{5}{3}}$

cos: −

cos: −
tan: +
sin: −



$\sin\theta = \frac{-3}{5}$

Quad 4

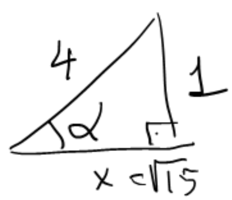
b) Given $\sin\theta = -\frac{1}{4}$ and $\tan\theta < 0$, find $\cos\theta$.

sin: +

sin: +

sin: −
tan: +

sin: −
tan: −
cos: +



$1^2 + x^2 = 16$

$x^2 = 15$

$x = \sqrt{15}$

$\cos\theta = \boxed{\frac{\sqrt{15}}{4}}$

$\frac{A}{H}$

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

12. Simplify the following expressions:

$$\underbrace{5\sin^2 x + 5\cos^2 x}_{5(\sin^2 x + \cos^2 x)} + \underbrace{(1+\tan^2 x)} = \boxed{5 + \sec^2 x}$$

$$2\sec x \cot x + 2\csc x \tan x = 2 \cdot \frac{1}{\cancel{\cos x}} \cdot \frac{\cancel{\cos x}}{\sin x} + 2 \cdot \frac{1}{\cancel{\sin x}} \cdot \frac{\cancel{\sin x}}{\cos x}$$

$$= \frac{2}{\sin x} + \frac{2}{\cos x} = \boxed{2\csc x + 2 \cdot \sec x}$$

$$5\sin x \csc x - 2\cos x \sec x$$

$$\underbrace{5 \cdot \cancel{\sin x} \cdot \frac{1}{\cancel{\sin x}}} - \underbrace{2 \cdot \cancel{\cos x} \cdot \frac{1}{\cancel{\cos x}}} = 5 - 2 = \boxed{3}$$

$\boxed{\tan x \cdot \cot x = 1}$

$$\frac{4\tan x \cot x}{2\sin^2 x + 2\cos^2 x} = \frac{4 \cdot 1}{2(\sin^2 x + \cos^2 x)} = \frac{4}{2} = \boxed{2}$$

Popper RT2

* PT2

4)

5)