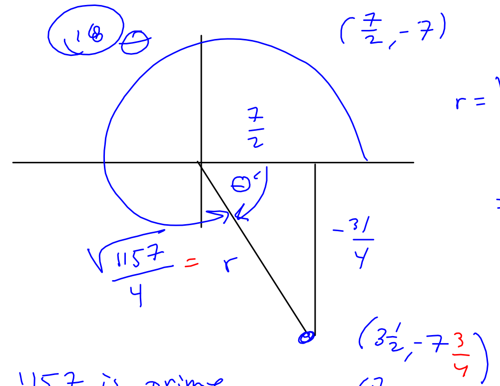
§1.4 #s 58, 62, 18,

18 θ $\left(\frac{7}{2}, -7\right)$



$= \left(\frac{7}{2}, -\frac{31}{4}\right)$

$3\frac{1}{2} = 3 + \frac{1}{2}$

$r = \sqrt{x^2+y^2} = \sqrt{\left(\frac{7}{2}\right)^2 + \left(\frac{31}{4}\right)^2}$

$= \sqrt{\frac{49}{4}\cdot\frac{4}{4} + \frac{961}{16}} = \sqrt{\frac{196+961}{16}}$

$= \frac{\sqrt{1157}}{\sqrt{16}} = \frac{\sqrt{1157}}{4}$

1157 is prime,

so ...

$\sin\theta = \frac{y}{r} = \frac{-\frac{31}{4}}{\frac{7}{2}} = -\frac{31}{4}\cdot\frac{2}{7}$

$= -\frac{31}{14}$

This is $\frac{y}{x} = \tan\theta$, dummy

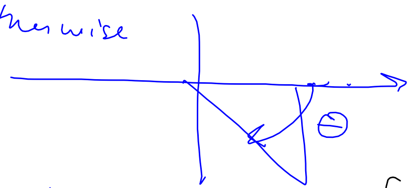
Radical (root) of the quotient is the quotient of the radicals

$\sqrt{\frac{2}{6}} = \frac{\sqrt{2}}{\sqrt{6}}$

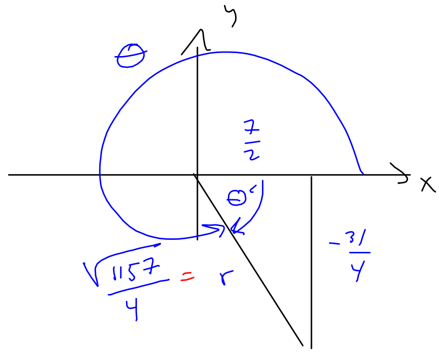
θ' is the REFERENCE ANGLE

If we're told that $0 < \theta < 2\pi$, then I nailed the picture.

otherwise



would be legit



$\sin\theta = \frac{y}{r} = \frac{-\frac{31}{4}}{\frac{\sqrt{1157}}{4}} = -\frac{31}{4}\cdot\frac{4}{\sqrt{1157}} = \boxed{\frac{-31}{\sqrt{1157}} = \sin\theta}$

simplified Radical form.

$\frac{-31}{\sqrt{1157}}\cdot\frac{\sqrt{1157}}{\sqrt{1157}} = \boxed{\frac{-31\sqrt{1157}}{1157}}$

Fine by me, unless I SPECIFY simplified radical form.

(half-angle formula exercises)

$\cos\theta = \frac{x}{r} = \frac{7}{2}\cdot\frac{4}{\sqrt{1157}} = \boxed{\frac{14}{\sqrt{1157}} = \cos\theta}$

$\tan\theta = \frac{y}{x} = \frac{\frac{y}{r}}{\frac{x}{r}} = \frac{\sin\theta}{\cos\theta} = \frac{-31}{\sqrt{1157}}\cdot\frac{\sqrt{1157}}{14} = \boxed{\frac{-31}{14} = \tan\theta}$

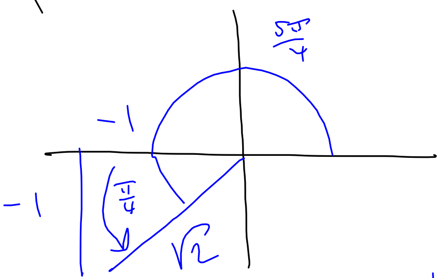
$\boxed{\csc\theta = -\frac{\sqrt{1157}}{31}}$,

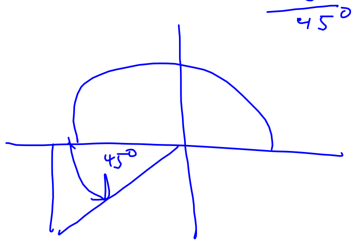
$\boxed{\sec\theta = \frac{\sqrt{1157}}{14} \qquad \cot\theta = -\frac{14}{31}}$

§1.4 #61

$$\frac{5\pi}{4}\cdot\frac{180^\circ}{\pi} = 225^\circ$$

$$\begin{array}{r} 225^\circ \\ -180^\circ \\ \hline 45^\circ \end{array}$$





$$\sin\theta = \frac{y}{r} = \frac{opp}{hyp} = \boxed{-\frac{1}{\sqrt{2}} = \sin\theta} \qquad -\frac{\sqrt{2}}{2}$$

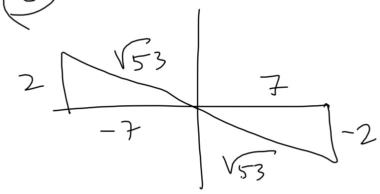
$$\boxed{\cos\theta = -\frac{1}{\sqrt{2}}} = -\frac{\sqrt{2}}{2}$$

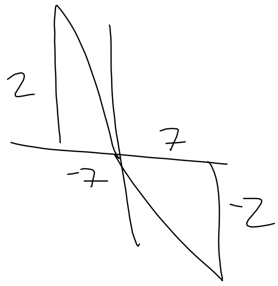
$$\tan\theta = \frac{-1}{-1} = \boxed{1 = \tan\theta}$$

$2\overline{)1.414}$

$1.414\overline{)1.000}$

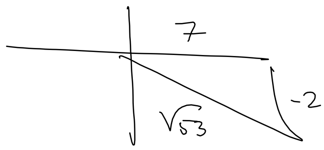
(a) $\tan\theta = -\frac{2}{7}$





$2^2+7^2 = 4+49 = 53$

(b) $\cos\theta > 0$



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

$\cos\theta = \frac{7}{\sqrt{53}}$ $\quad \sec\theta = \frac{\sqrt{53}}{7}$

$\tan\theta = \frac{-2}{7}$ $\quad \cot\theta = -\frac{7}{2}$

(c) $\tan\theta = -\frac{2}{7}$

$\boxed{\text{TAN}^{-1}}$ is inverse tangent, which can be confused with $\frac{1}{\text{TAN}}$ b/c mathematicians are jerks. I prefer $\boxed{\text{arctangent}} = \tan^{-1}$

Inverse of the TRIG OPERATION, tangent.

Arithmetic inverse wrt multiplication

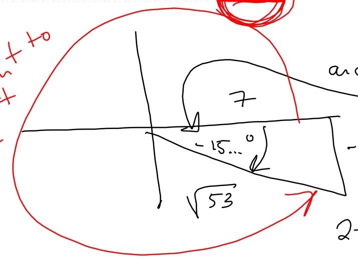
$\tan\theta = -\frac{2}{7} \Rightarrow \arctan(\tan\theta) = \arctan\left(-\frac{2}{7}\right)$

```
tan⁻¹(-2/7)
         -.278299659
Ans*180/π
         -15.9453959
▬
```

(d) $\theta \approx -.278299659$?

≈ -15.9453959 ?

Not quite



want to measure it counter-clockwise

arctangent says

We want $\theta \in [0, 2\pi)$

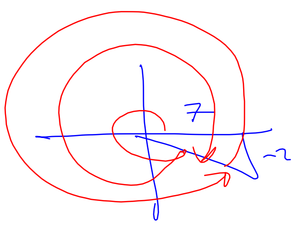
$-.278... < 0$

$2\pi - .278... = \theta$

```
         -.278299659
Ans*180/π
         -15.9453959
tan⁻¹(-2/7)
         -.278299659
Ans+2π
         6.004885648
```

$\theta \approx 6.004885648$

$\boxed{\theta \approx 6.005}$




```
         -15.9453959
tan⁻¹(-2/7)
         -.278299659
Ans+2π
         6.004885648
Ans*180/π
         344.0546041
▮
```

$\Rightarrow \theta \approx 344.0546041$

$\boxed{\theta \approx 344.055^\circ}$

Jan 31-9:05 AM

4. Answer the questions about the equation $\tan(\theta) = -\frac{2}{7}$.

   a. (5 points) Sketch two triangles that satisfy $\tan(\theta) = -\frac{2}{7}$.

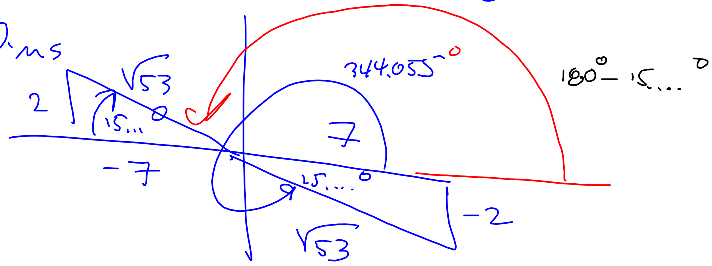
   b. (5 pts) Suppose that $\cos(\theta) > 0$. Find the other five trigonometric functions of θ.

   c. (5 pts) Assuming $0 \le \theta < 2\pi$, find θ, in radians *and* degrees, rounded to 3 decimal places.

   d. (5 pts) Give *all* solutions to the equation ~~$\sin(\theta)$~~ $\tan\theta = -\frac{2}{7}$ $= -\frac{2}{7}$, in degrees *and* radians, rounded to three (3) decimal places.

Do NOT ASSUME $\cos\theta > 0$, any more.

FIND ALL sol'ns



How to find the other solutions?

Method 1:

Observe that the 2 triangles are 180° apart. So to get the 2nd, add/subtract 180° from the 1st one

$\mathbb{Z} = \{0, \pm 1, \pm 2, \pm 3, \ldots\}$

$344.055^\circ \pm 180^\circ \cdot 3$

$\{344.055^\circ + 180^\circ n \mid n \in \mathbb{Z}\}$

OR

$\{6.005 + n\pi \mid n \in \mathbb{Z}\}$

Method 2:

$180^\circ - 15.\ldots^\circ \approx 164.055^\circ$

So $\{344.055^\circ + 360^\circ n \mid n \in \mathbb{Z}\}$

$\{164.055^\circ + 360^\circ n \mid n \in \mathbb{Z}\}$