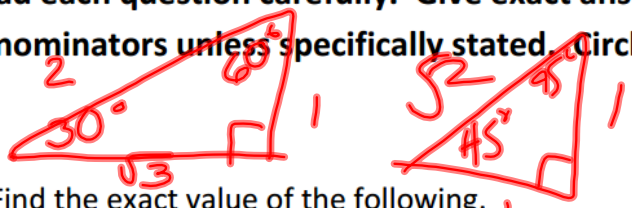
Read each question carefully. Give exact answers. You do not have to rationalize denominators unless specifically stated. Circle your final answer.



1. Find the exact value of the following.

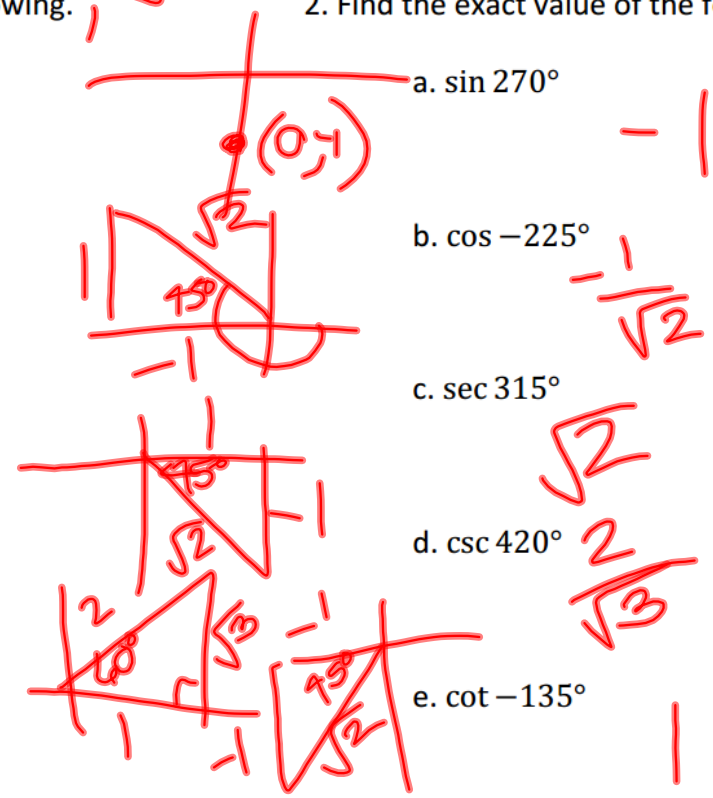
a. $\sin\frac{\pi}{3}$ $\frac{\sqrt{3}}{2}$

b. $\cos\frac{\pi}{4}$ $\frac{1}{\sqrt{2}}$

c. $\tan\frac{\pi}{6}$ $\frac{1}{\sqrt{3}}$

d. $\sec 30°$ $\frac{2}{\sqrt{3}}$

e. $\csc 45°$ $\sqrt{2}$



2. Find the exact value of the following.

a. $\sin 270°$ -1

b. $\cos -225°$ $-\frac{1}{\sqrt{2}}$

c. $\sec 315°$ $\sqrt{2}$

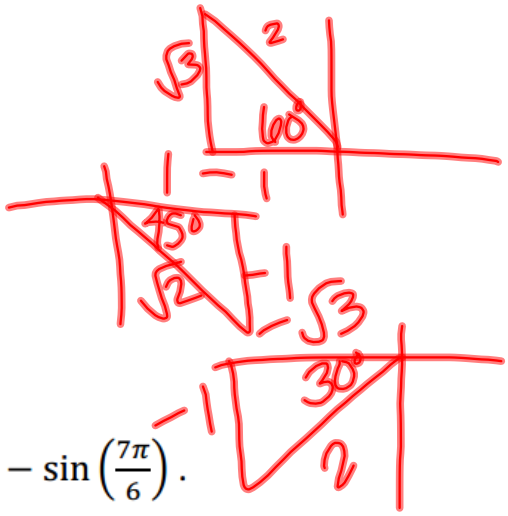
d. $\csc 420°$ $\frac{2}{\sqrt{3}}$

e. $\cot -135°$ 1

3. a. Find the exact value of $\cos\frac{2\pi}{3}$. $-\frac{1}{2}$

b. Find the exact value of $\tan\frac{7\pi}{4}$. -1

c. Find the exact value of $\sin\frac{7\pi}{6}$. $-\frac{1}{2}$



d. Find the exact value of $\cos\left(\frac{2\pi}{3}\right)\tan\left(\frac{7\pi}{4}\right) - \sin\left(\frac{7\pi}{6}\right)$.

Write the answer as a single fraction with a rationalized denominator.

$\left(-\frac{1}{2}\right)(-1) - \left(-\frac{1}{2}\right) = \frac{1}{2} + \frac{1}{2} = \boxed{1}$

4. Given that $\sin\theta = -\frac{3}{5}$ and θ is in Quadrant III, find the other 5 trig functions of θ.

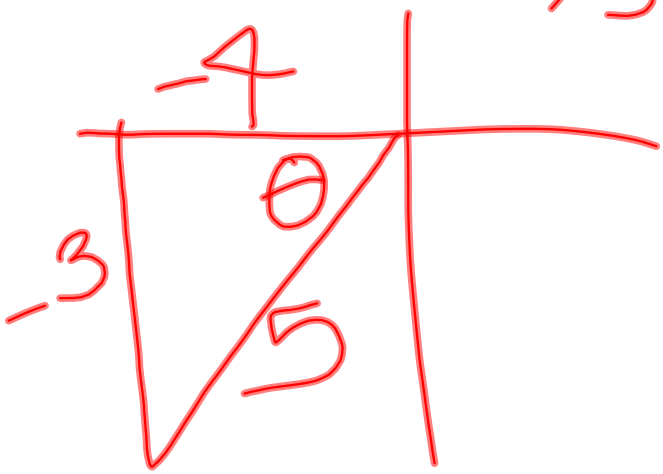
a. $\cos\theta =$ $-4/5$

b. $\tan\theta =$ $3/4$

c. $\sec\theta =$ $-5/4$

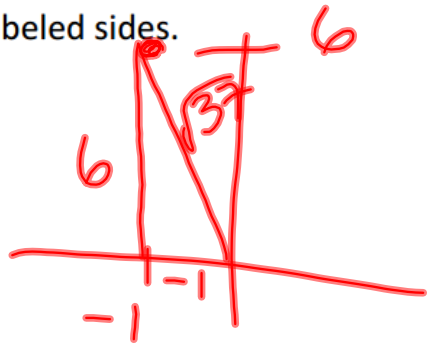
d. $\csc\theta =$ $-5/3$

e. $\cot\theta =$ $4/3$



5. Given that the terminal side of an angle β passes through the point $(-1, 6)$,

a. Draw a picture depicting the reference triangle with accurately labeled sides.



b. Find the length of the hypotenuse.

$\sqrt{6^2+(-1)^2} = \sqrt{37}$

c. Evaluate $\cot\beta$.

$-1/6$

d. Evaluate $\cos\beta$.

$-1/\sqrt{37}$

e. Evaluate $\csc\beta$.

$\sqrt{37}/6$

6. Given $\theta = \frac{5\pi}{3}$,

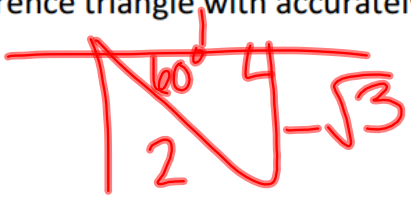
a. Convert θ to degrees.

$\frac{5\pi}{3} \cdot \frac{180^\circ}{\pi} = 300^\circ$

b. In which quadrant does the terminal side of θ lie? IV

c. What is the degree measure of its reference angle? 60°

d. Draw a picture depicting the reference triangle with accurately labeled sides.



e. Find the exact value of $\csc\theta$.

$-\frac{2}{\sqrt{3}}$

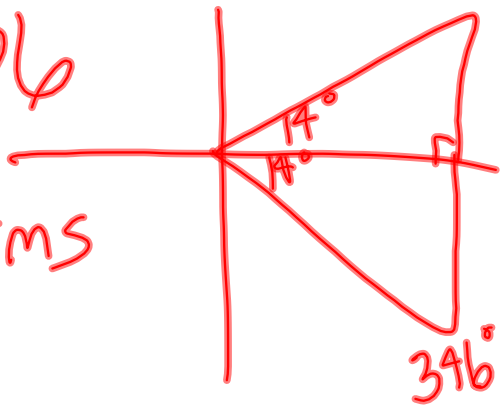
7. Given that $\sec 14° \approx 1.0306$, $\csc 14° = 4.1336$, and $\cot 14° \approx 4.0108$, find (without using a calculator),

a. $\sec 76° =$ $\csc 14° = 4.1336$

b. $\csc 76° =$ $\sec 14° = 1.0306$

$\cot 346° = -4.0108$

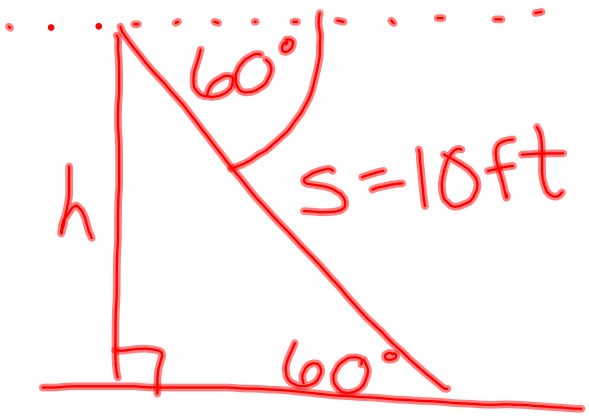
$\csc 194° = -4.1336$



Write $\cos 166°$ in terms of $\sec, \csc, \cot 14°$.

$-\cos 14° = \dfrac{-1}{\sec 14°}$

8. The angle of depression to the bottom of a slide is 60°. If a child slides down at a rate of 5 feet per second, and it takes 2 seconds for the child to reach the bottom, what is the vertical height of the slide, in feet?



$V = \frac{s}{t}$ $v = 5\ ft/s$ $t = 2\ s$

$s = v \cdot t : \frac{5\ ft}{s} \cdot 2\ s$

$= 10\ ft$

$\sin 60° = \frac{h}{10\ ft}$

$h = 10 \sin 60° = 10 \cdot \frac{\sqrt{3}}{2} = 5\sqrt{3}\ ft$

9. A wheel with a 24 inch diameter rotates at a rate of 5 revolutions per minute. What is the linear speed of a point on its rim in feet per second?

$r = 12\text{ in};\ \omega = 5\text{ rev/min};\ V = ?\text{ ft/s}$

$$V = r\omega = 12\text{ in} \cdot \frac{5\text{ rev}}{\text{min}} \cdot \frac{1\text{ ft}}{12\text{ in}} \cdot \frac{1\text{ min}}{60\text{ s}} \cdot \frac{2\pi}{1\text{ rev}}$$

$$= \frac{\pi}{6}\text{ ft/s}$$

10. Find the exact measure in centimeters of the intercepted arc of a circle with radius 25 centimeters and central angle $45°$.

$s = ?\,cm;\ r = 25\,cm;\ \theta = 45°$

$s = r\theta = 25cm \cdot 45° \cdot \frac{\pi}{180°} =$

$= \frac{25\pi}{4}\,cm$

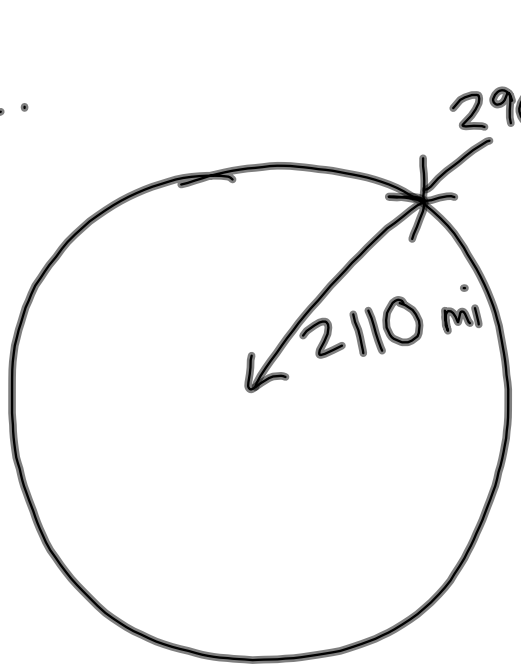
1. $s = 3\text{ mi}$; $\theta = 2640\text{ rev}$; $r = ?\text{ in}$

$$\frac{s}{\theta} = \frac{r\theta}{\theta}$$

$$r = \frac{s}{\theta} = \frac{3\text{ mi}}{2640\text{ rev}} \cdot \frac{5280\text{ ft}}{1\text{ mi}} \cdot \frac{12\text{ in}}{1\text{ ft}} \cdot \frac{1\text{ rev}}{2\pi}$$

$$= \frac{36}{\pi}\text{ in}$$

2.



1 rev / 2 hrs

$V = ?$ mi/h

$r = 2110 + 290 = 2400$ mi

$\omega = 1 \text{ rev} / 2 \text{ hrs}$

$$V = r\omega = 2400 \text{ mi} \cdot \frac{1 \text{ rev}}{2 \text{ hrs}} \cdot \frac{2\pi}{1 \text{ rev}} =$$

$$= 2400\pi \text{ mi/h}$$

3. $r = 24$ in ; $v = 8$ mi/h ; $\omega = ?$ rev/min

$\frac{v}{r} = \frac{r\omega}{r}$

$\omega = \frac{v}{r} = v \cdot \frac{1}{r}$

$3\overline{)528}$

$= \frac{8 \text{ mi}}{\text{h}} \cdot \frac{1}{24 \text{ in}} \cdot \frac{1 \text{ h}}{60 \text{ min}} \cdot \frac{5280 \text{ ft}}{1 \text{ mi}} \cdot \frac{12 \text{ in}}{1 \text{ ft}} \cdot \frac{1 \text{ rev}}{2\pi}$

$= \frac{176}{\pi}$ rev/min

4. $r = 3\text{ ft}; \theta = ?^\circ; s = 4\text{ in}$

$$\frac{s}{r} = \frac{r\theta}{r}$$

$$\theta = \frac{s}{r} = \frac{4\text{ in}}{3\text{ ft}} \cdot \frac{1\text{ ft}}{12\text{ in}} \cdot \frac{180^\circ}{\pi}$$

$$= \frac{20}{\pi}^\circ$$