Homework for Test #1:
HW #1: Submitted 11/08:
• 5.1 #1, 2, 7 18 all, 31 74 all
• 4 problems on handout
• 5.2 #1 33odd

HW #2: Submitted Friday 11/15:
• 5.2 #35-41odd; 59-75odd
• 5.3 #1-35odd; 37-48all; 61-68all
• 5.4 #1-22 all;
• 5.4 #33-39odd

HW #3: Due Monday 11/19:
• 5.4 #41-67odd; 71-97odd
• Test #1 Practice Problems (handout)

Test #1 - Wednesday, 11/20

Evaluate the trigonometric expressions. Give exact answers. You do not have to rationalize.
Draw a picture if it helps.

1. $\sin 315° = \quad -\dfrac{1}{\sqrt{2}}$

4. $\cos 720° = \quad 1$

2. $\sec(-240°) = \quad -2$

5. $\sec(-135°) = \quad -\sqrt{2}$

3. $\tan 270° = \quad$ undef.

6. $\cot 150° = \quad -\sqrt{3}$

7. A reference angle α is the acute angle between the terminal side of the given angle θ and the x-axis.

8. The function value of an acute angle θ is equal to the cofunction value of the complement of θ.

9. Two angles are considered to be coterminal if they differ by integer multiples of 360°.

A. $\cos\dfrac{7\pi}{2} = \quad 0$

B. $\sin\dfrac{11\pi}{6} = \quad -\dfrac{1}{2}$

C. $\tan\left(-\dfrac{5\pi}{4}\right) = \quad -1$

$$\underline{5.4}$$

73. $\dfrac{\cot x}{1} + \dfrac{1}{\cot x}$

$$\dfrac{\sin^2 x}{\sin^2 x} + \dfrac{\cos^2 x}{\sin^2 x} = \dfrac{1}{\sin^2 x}$$

$$1 + \cot^2 x = \csc^2 x$$

$$= \dfrac{\cot^2 x + 1}{\cot x}$$

$$= \dfrac{\csc^2 x}{\cot x} = \dfrac{\frac{1}{\sin^2 x}}{\frac{\cos x}{\sin x}} = \dfrac{1}{\sin^2 x} \cdot \dfrac{\sin x}{\cos x} =$$

$$= \dfrac{1}{\sin x \cos x} = \boxed{\csc x \sec x}$$

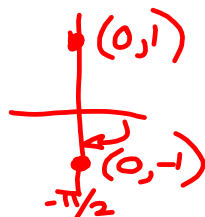---

1. Find the exact value of the following.

   a. $\cot \dfrac{\pi}{3}$　$\dfrac{1}{\sqrt{3}}$

   b. $\sin \dfrac{\pi}{4}$　$\dfrac{1}{\sqrt{2}}$

   c. $\csc \dfrac{\pi}{2}$　1

   d. $\cos 30°$　$\sqrt{3}/2$

   e. $\sec 60°$　2

3.　a. Find the exact value of $\csc\left(-\dfrac{\pi}{2}\right)$.　-1

   b. Find the exact value of $\cot \dfrac{5\pi}{4}$.　1

   c. Find the exact value of $\csc \dfrac{11\pi}{6}$.　-2

   d. Find the exact value of $\csc\left(-\dfrac{\pi}{2}\right)\cot\dfrac{5\pi}{4} - \csc\dfrac{11\pi}{6}$.

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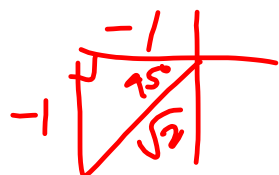$$-1 + 2 = \boxed{1}$$

2. Find the exact value of the following.
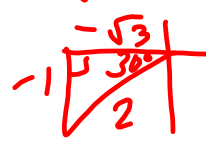
   a. $\cos 225°$　$-\dfrac{1}{\sqrt{2}}$

   b. $\tan(-240°)$　$-\sqrt{3}$

   c. $\sec 540°$　-1

   d. $\sin(-150°)$　$-1/2$

   e. $\csc 135°$　$\sqrt{2}$

$$\begin{aligned} 4\,&840° \\ -\,&360° \\ \hline &180° \end{aligned}$$
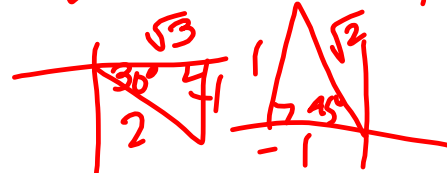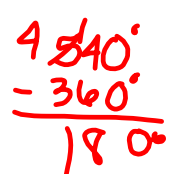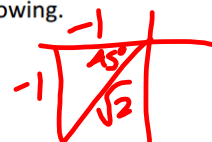
4. Given that $\tan\theta = -\frac{12}{5}$ and θ is in Quadrant IV, find the other 5 trig functions of θ.

a. $\sin\theta =$ $-12/13$

d. $\csc\theta =$ $-13/12$
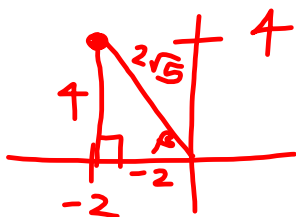
b. $\cos\theta =$ $5/13$

e. $\cot\theta =$ $-5/12$

c. $\sec\theta =$ $13/5$

5. Given that the terminal side of an angle β passes through the point $(-2, 4)$,

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

c. Evaluate $\cot\beta$.

$\frac{-2}{4} = \boxed{\frac{-1}{2}}$

d. Evaluate $\csc\beta$.

$\frac{2\sqrt5}{4} = \boxed{\frac{\sqrt5}{2}}$

b. Find the length of the hypotenuse. (simplify all radicals)

$h = \sqrt{4^2 + (-2)^2} = \sqrt{20} = \boxed{2\sqrt5}$

e. Evaluate $\cos\beta$.

$\frac{-2}{2\sqrt5} = \boxed{\frac{-1}{\sqrt5}}$

6. Given $\theta = \frac{23\pi}{6}$,

a. Convert θ to degrees. $\frac{23\pi}{6} \cdot \frac{180}{\pi} = \boxed{690°}$

$\begin{array}{r} 690 \\ -360 \\ \hline 330 \end{array}$

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

c. What is the degree measure of its reference angle? $\boxed{30°}$
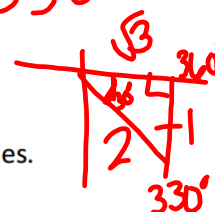
d. Draw a picture depicting the reference triangle with accurately labeled sides.
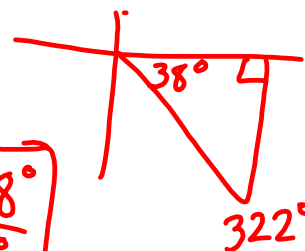
e. Find the exact value of $\cos\theta$.

$\sqrt3/2$

7. Write the following in terms of $\sin 38°$ and $\cos 38°$.

a. $\csc 322° =$ $-\csc 38° = \boxed{-1/\sin 38°}$

b. $\tan 52° =$ $\tan(90° - 38°) = \cot 38° = \boxed{\dfrac{\cos 38°}{\sin 38°}}$

3

8. The angle of depression from the top of a cliff to an object on the ground is 30°. If the object is 250 feet from the base of the cliff, how tall is the cliff? Give an exact answer in feet.

$$\tan 30° = \frac{h}{250 \text{ft}}$$

$$h = 250 \tan 30° \text{ ft} = 250 \cdot \frac{1}{\sqrt{3}} = \boxed{\frac{250}{\sqrt{3}} \text{ ft}}$$

9. A child rides his tricycle at a rate of 20 miles per hour. If the diameter of the front wheel is 8 inches, find the angular speed of the wheel in revolutions per minute. Give an exact answer, in terms of π if necessary.

$$V = \frac{20 \text{ mi}}{h} \; ; \; r = 4 \text{ in} \; ; \; \omega = ? \frac{\text{rev}}{\text{min}} \qquad \frac{V}{r} = \frac{r\omega}{r} \; ; \; \omega = \frac{V}{r}$$

$$\omega = \frac{20 \text{ mi}}{h} \cdot \frac{1}{4 \text{ in}} \cdot \frac{1 h}{60 \text{ min}} \cdot \frac{12 \text{ in}}{1 \text{ ft}} \cdot \frac{5280 \text{ ft}}{1 \text{ mi}} \cdot \frac{1 \text{ rev}}{2\pi}$$

$$= \boxed{\frac{2640}{\pi} \text{ rev}/\text{min}}$$

10. Find the exact measure in inches of the radius of a circle with a central angle of 72° that subtends an arc of length 8 feet.

$$r = ? \text{ in} \; ; \; \theta = 72° \; ; \; S = 8 \text{ ft} \; ; \; \frac{S}{\theta} = \frac{r\theta}{\theta} \; ; \; r = \frac{S}{\theta}$$

$$r = \frac{8 \text{ ft}}{72°} \cdot \frac{12 \text{ in}}{1 \text{ ft}} \cdot \frac{180°}{\pi} = \boxed{\frac{240}{\pi} \text{ in}}$$

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?

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

$$V = \frac{12 \text{ in}}{1} \cdot \frac{5 \text{ rev}}{\text{min}} \cdot \frac{1 \text{ ft}}{12 \text{ in}} \cdot \frac{2\pi}{1 \text{ rev}} \cdot \frac{1 \text{ min}}{60 s} = \boxed{\frac{\pi}{6} \text{ ft}/s}$$

Given that $\csc\theta = -\dfrac{5}{4}$ and θ is in quadrant III, <u>evaluate</u>

15. $\sin\theta$

16. $\tan\theta$

Write in terms of $\sin 20°$ and/or $\cos 20°$.

19. $\csc 20°$

20. $\sin 70°$

21. $\cos 200°$

22. $\sec 290°$ = $\sec 70°$

$= \csc 20°$

$= \dfrac{1}{\sin 20°}$
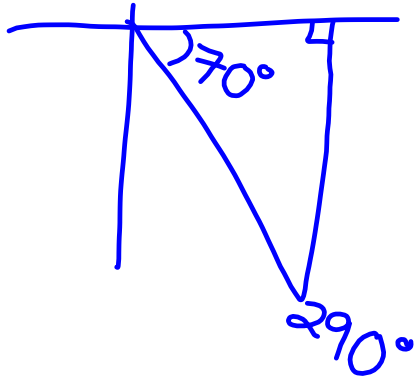
24. A motorcyclist dangerously rides his bike at a rate of 120 miles per hour. If the diameter of the front wheel is 24 inches, find the angular speed of the wheel in revolutions per minute.