

I. Convert the following to degrees or radians.

1.  $-210^\circ \cdot \frac{\pi}{180}$

$-\frac{7\pi}{6}$

2.  $\frac{5\pi}{6} \cdot \frac{180}{\pi}$

$150^\circ$

3.  $\frac{11\pi}{9} \cdot \frac{180}{\pi}$

$220^\circ$

4.  $50^\circ \cdot \frac{\pi}{180}$

$\frac{5\pi}{18}$

5.  $\frac{-5\pi}{18}$

$-50^\circ$

6.  $330^\circ$

$\frac{11\pi}{6}$

7.  $-315^\circ$

$-\frac{7\pi}{4}$

8.  $\frac{-41\pi}{36}$

$-205^\circ$

9.  $75^\circ$

$\frac{5\pi}{12}$

10.  $\frac{\pi}{2}$

$90^\circ$

11.  $180^\circ$

$\pi$

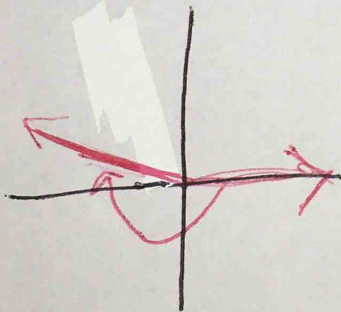
12.  $\frac{-11\pi}{6}$

$-330^\circ$

II. Sketch the following in standard form. Determine the quadrant in which its terminal side lies.

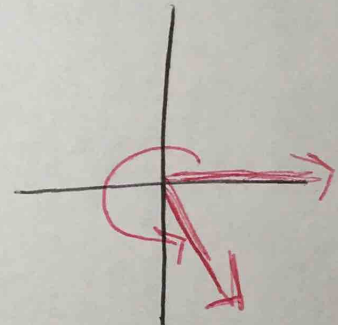
(13)  $-200^\circ$

Q2



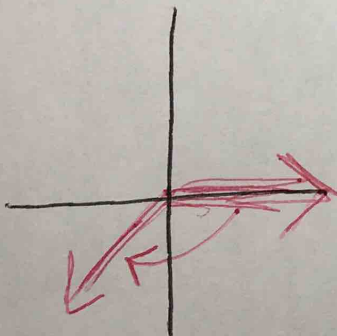
(14)  $\frac{7\pi}{4}$

Q4



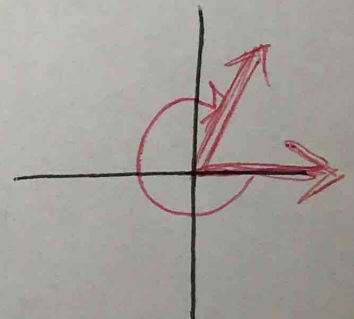
(15)  $-\frac{3\pi}{4}$

Q3



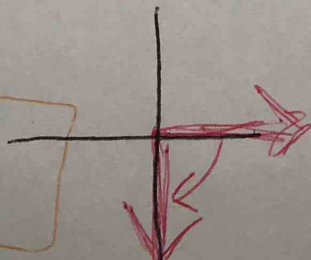
(16)  $-310^\circ$

Q1



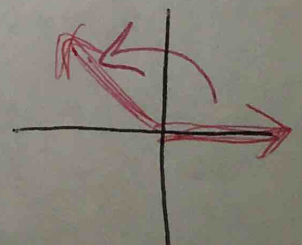
(17)  $-\frac{\pi}{2}$

Quadrantal



(18)  $120^\circ$

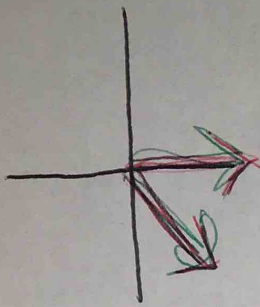
Q2



III. Find the reference angles of the following and state which quadrant the terminal side lies in:

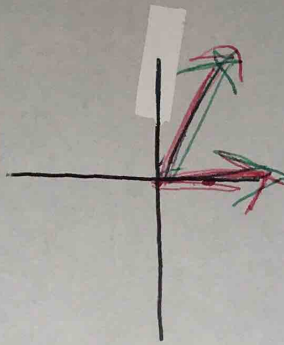
19.  $-35^\circ$

$35^\circ$   
Q4



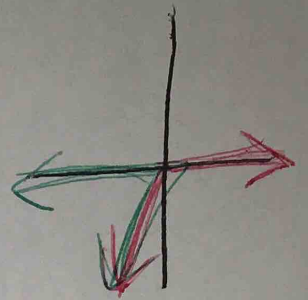
20.  $52^\circ$

$52^\circ$   
Q1



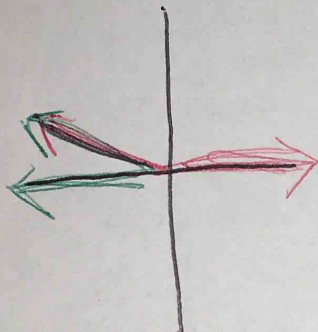
21.  $-100^\circ$

$80^\circ$   
Q3



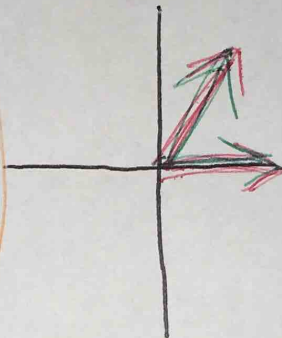
22.  $140^\circ$

$40^\circ$   
Q2



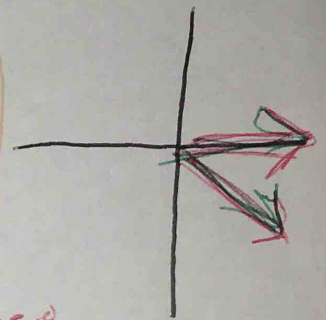
23.  $\frac{\pi}{4}$

$45^\circ$   
Q1



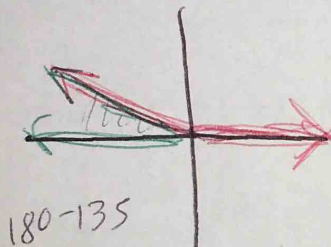
24.  $\frac{7\pi}{4}$

$45^\circ$   
Q4



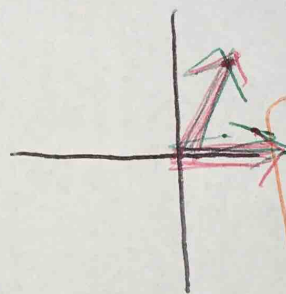
25.  $-225^\circ + 360 = 135^\circ$

$45^\circ$   
Q2



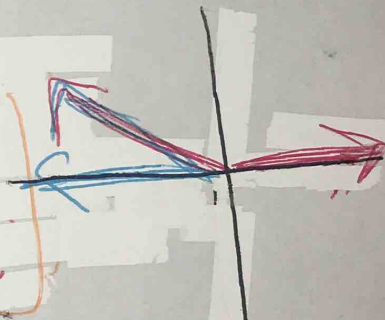
26.  $\frac{-7\pi}{4}$

$45^\circ$   
Q1



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

$30^\circ$   
Q2



IV. Find two positive and two negative coterminal angles for each of the following:

28.  $-1000^\circ$

negative  
 $-640^\circ$   
 $-280^\circ$

positive  
 $80^\circ$   
 $440^\circ$

29.  $\frac{7\pi}{3}$

neg  
 $-\frac{5\pi}{3}$   
 $-\frac{11\pi}{3}$

pos  
 $\frac{\pi}{3}$   
 $\frac{13\pi}{3}$

30.  $550^\circ$

neg  
 $-170^\circ$   
 $-530^\circ$

pos  
 $190^\circ$   
 $910^\circ$

31.  $-380^\circ$

neg  
 $-20^\circ$   
 $-740^\circ$

pos  
 $340^\circ$   
 $700^\circ$

32.  $\frac{\pi}{6}$

neg  
 $-\frac{11\pi}{6}$   
 $-\frac{23\pi}{6}$

pos  
 $\frac{13\pi}{6}$   
 $\frac{25\pi}{6}$

33.  $-17^\circ$

neg  
 $-377^\circ$   
 $-737^\circ$

pos  
 $343^\circ$   
 $703^\circ$

V. Determine if each pair are coterminal angles:

34.  $-1550^\circ$  and  $240^\circ$

$$-1550 + 360 = -1190$$

$$-1190 + 360 = -830$$

$$-830 + 360 = -470$$

$$-470 + 360 = -110$$

$$-110 + 360 = 250^\circ$$

No

35.  $\frac{\pi}{9}, \frac{37\pi}{9}$

$$\frac{37\pi}{9} - 2\pi = \frac{19\pi}{9}$$

$$\frac{19\pi}{9} - 2\pi = \frac{\pi}{9}$$

Yes

VI. Find the coterminal angle of the given angle with given number of rotations:

36.  $\theta = 303^\circ$ , 2 counterclockwise rotations

$$303 + 360 + 360$$

$$= 1023^\circ$$

37.  $\theta = -15^\circ$ , 4 clockwise rotations

$$-15 - 360 - 360 - 360 - 360$$

$$= -1455^\circ$$

38.  $\frac{17\pi}{6}$ , 2 rotations counterclockwise

$$\frac{17\pi}{6} + 2\pi + 2\pi$$

$$\frac{41\pi}{6}$$

39.  $\frac{\pi}{2}$ , 1 clockwise rotation

$$\frac{\pi}{2} - 2\pi$$

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

VII. Measure the angle with given rotation. WRITE YOUR ANSWER IN DEGREES AND RADIANS.

40.  $\frac{8}{3}$  rotation, clockwise

Degrees:  $\frac{8}{3}(-360) = -960^\circ$

Radians:  $\frac{8}{3}(-2\pi) = -\frac{16\pi}{3}$

41.  $\frac{3}{4}$  rotation, counterclockwise

Degrees:  $\frac{3}{4}(360) = 270^\circ$

Radians:  $\frac{3}{4}(2\pi) = \frac{3\pi}{2}$

42.  $\frac{10}{3}$  rotation, clockwise

Degrees:  $\frac{10}{3}(-360) = -1200^\circ$

Radians:  $\frac{10}{3}(-2\pi) = -\frac{20\pi}{3}$

43.  $\frac{2}{3}$  rotation, counterclockwise

Degrees:  $\frac{2}{3}(360) = 240^\circ$

Radians:  $\frac{2}{3}(2\pi) = \frac{4\pi}{3}$