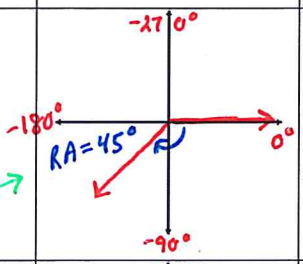
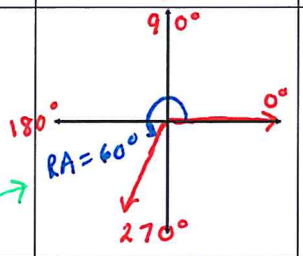
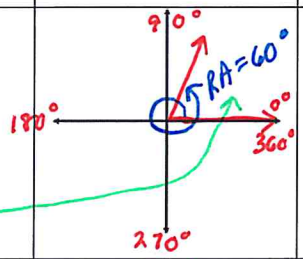
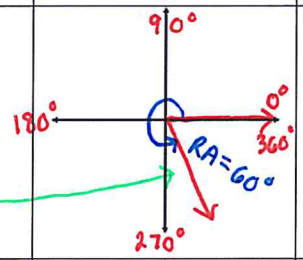
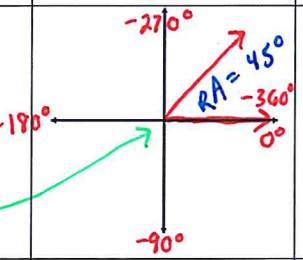
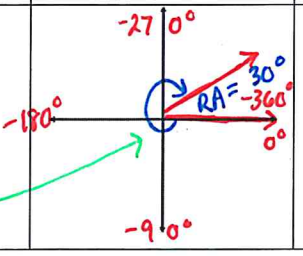
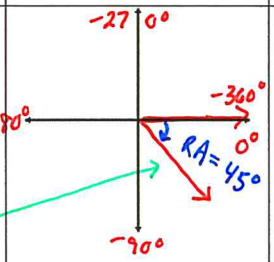
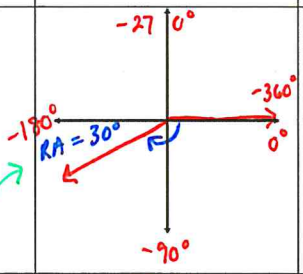
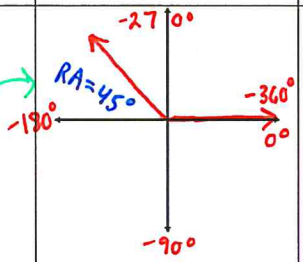
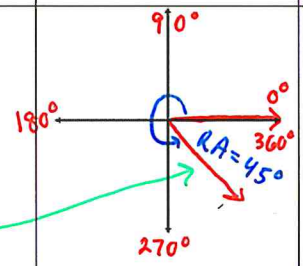
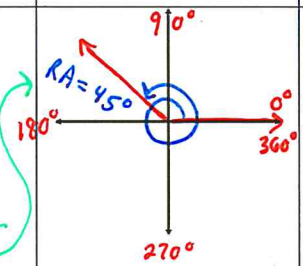
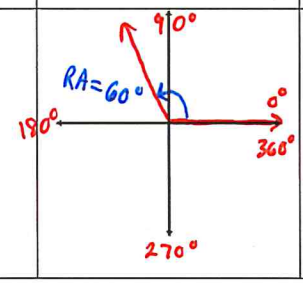
Trigonometry

Emphasis on the Hand Trick – Reciprocal Functions

Using the hand trick discussed in class, give the exact value of each of the following trig functions:

Given Angle	Reference Angle	Quadrant Terminal Side is located in	Exact Value
1. csc -135^o 180 −135		Quadrant III Only tan is positive in III meaning cot also.	$\sin = \frac{-\sqrt{2}}{2}$ so $\frac{-2\cdot\sqrt{2}}{\sqrt{2}\cdot\sqrt{2}} = \frac{-2\sqrt{2}}{2}$ $= \boxed{-\sqrt{2}}$
2. sec 240^o 240 −180		Quadrant III Only tan is positive in III meaning cot also.	$\cos = \frac{-1}{2} = \frac{-1}{2}$ so $\frac{-2}{1} = \boxed{-2}$
3. cot 420^o 420 −360		Quadrant I All functions are positive in QI	$\tan = \frac{\sqrt{3}}{\sqrt{1}} = \frac{\sqrt{3}}{1}$ so $\frac{1\cdot\sqrt{3}}{\sqrt{3}\cdot\sqrt{3}} = \boxed{\frac{\sqrt{3}}{3}}$
4. csc 300^o 360 −300		Quadrant IV Only cos is positive in IV meaning sec as well.	$\sin = \frac{-\sqrt{3}}{2}$ So $\frac{-2\cdot\sqrt{3}}{\sqrt{3}\cdot\sqrt{3}}$ $= \boxed{\frac{-2\sqrt{3}}{3}}$
5. sec -315^o 360 −315		Quadrant I All functions are positive in QI.	$\cos = \frac{\sqrt{2}}{2}$ So $\frac{2\cdot\sqrt{2}}{\sqrt{2}\cdot\sqrt{2}} = \frac{2\sqrt{2}}{2}$ $= \boxed{\sqrt{2}}$
6. cot -330^o 360 −330		Quadrant I All functions are positive in QI	$\tan = \frac{\sqrt{1}}{\sqrt{3}} = \frac{1}{\sqrt{3}}$ So $\frac{\sqrt{3}}{1} = \boxed{\sqrt{3}}$

Given Angle	Reference Angle	Quadrant Terminal Side is located in	Exact Value
7. $\csc -\frac{\pi}{4}$ 45 -0 $-45°$ $-\frac{\pi}{4} \cdot \frac{180}{\pi} = -45°$		Quadrant IV Only cos is positive in IV So sec is as well.	$\sin = \frac{-\sqrt{2}}{2}$ So $\frac{-2 \cdot \sqrt{2}}{\sqrt{2} \cdot \sqrt{2}} = \frac{-2\sqrt{2}}{2}$ $= \boxed{-\sqrt{2}}$
8. $\sec -\frac{5\pi}{6}$ 180 -150 $-150°$ $-\frac{5\pi}{6} \cdot \frac{180}{\pi} = -150°$		Quadrant III Only tan is positive in III So cot is as well.	$\cos = \frac{-\sqrt{3}}{2}$ So $\frac{-2 \cdot \sqrt{3}}{\sqrt{3} \cdot \sqrt{3}} = \boxed{\frac{-2\sqrt{3}}{3}}$
9. $\cot -\frac{5\pi}{4}$ 225 -180 $-225°$ $-\frac{5\pi}{4} \cdot \frac{180}{\pi} = -225°$		Quadrant II Only sin is positive in II So csc is as well.	$\tan = \frac{-\sqrt{2}}{\sqrt{2}} = -1$ So $\boxed{-1}$
10. $\csc \frac{7\pi}{4}$ 360 -315 $315°$ $\frac{7\pi}{4} \cdot \frac{180}{\pi} = 315°$		Quadrant IV Only cos is positive in IV So sec is as well.	$\sin = \frac{-\sqrt{2}}{2}$ So $\frac{-2 \cdot \sqrt{2}}{\sqrt{2} \cdot \sqrt{2}} = \frac{-2\sqrt{2}}{2}$ $= \boxed{-\sqrt{2}}$
11. $\sec \frac{11\pi}{4}$ 495 -360 135 180 -135 $495°$ $\frac{11\pi}{4} \cdot \frac{180}{\pi} = 495°$		Quadrant II Only sin is positive in II So csc is as well	$\cos = \frac{-\sqrt{2}}{2}$ So $\frac{-2 \cdot \sqrt{2}}{\sqrt{2} \cdot \sqrt{2}} = \frac{-2\sqrt{2}}{2}$ $= \boxed{-\sqrt{2}}$
12. $\cot \frac{2\pi}{3}$ $120°$ $\frac{2\pi}{3} \cdot \frac{180}{\pi} = 120°$		Quadrant II Only sin is positive in II So csc is as well.	$\tan = \frac{-\sqrt{3}}{\sqrt{1}} = \frac{-\sqrt{3}}{1}$ So $\frac{-1 \cdot \sqrt{3}}{\sqrt{3} \cdot \sqrt{3}} = \boxed{\frac{-\sqrt{3}}{3}}$