MH 114: Test 1: Fall 2021 Name

You are allowed a 3x5 in card and a calculator. Please put your phone on desk where it is plainly visible. Thanks!

1.) If $\theta = 5\pi/4$ in radians then find the angle in degrees.

$$\theta = \left(\frac{5\pi}{4}\right)\left(\frac{180^\circ}{\pi}\right) = \boxed{225^\circ}$$

2.) Find the angle $0 < \alpha < 360$ degrees which is coterminal with $\theta = 500$ degrees

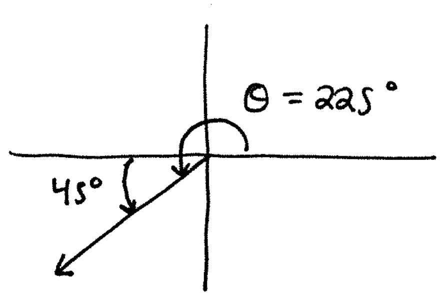
$$\alpha = \theta - 360^\circ = 500^\circ - 360^\circ = \boxed{140^\circ}$$

$$(0 < 140^\circ < 360^\circ)$$

3.) Convert 395 degrees to radians

$$\theta = (395^\circ)\left(\frac{\pi \text{ rad}}{180^\circ}\right) = \boxed{\frac{79\pi}{36}} \cong 6.894\ldots \quad (\text{radians})$$

4.) Picture both $\theta = 225$ degrees as well as the reference angle. [hint: reference angles are acute]



$$225^\circ = 180^\circ + 45^\circ$$

$$\underline{\theta_{\text{reference}} = 45^\circ}$$

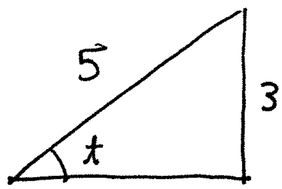
Sol^n to 5| $\sin^2 t + \cos^2 t = 1 \Rightarrow \cos^2 t = 1 - \sin^2 t \Rightarrow \cos t = \pm\sqrt{1-\sin^2 t}$

$\cos t = -\sqrt{1-\left(\frac{3}{5}\right)^2}$

$\cos t = -\sqrt{\frac{16}{25}}$

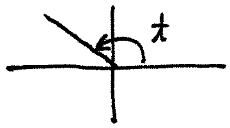
$\boxed{\cos t = \frac{-4}{5}}$

5.) Given $\sin(t) = 3/5$ and the angle is in Quadrant II, find cos(t).



$\sin(t) = \frac{3}{5} = \frac{\text{OPP}}{\text{HYP}}$

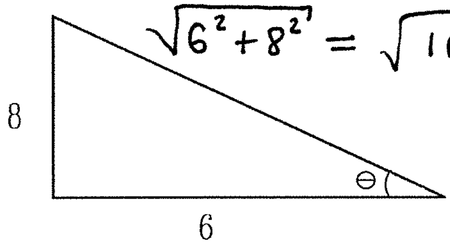
$\sqrt{5^2-3^2} = \sqrt{16} = 4 \Rightarrow \cos(t) = \pm\frac{4}{5}$



$\Rightarrow \boxed{\cos(t) = \frac{-4}{5}}$

6.) Find exact numerical values for $\sin(\theta)$, $\cos(\theta)$, $\tan(\theta)$, $sec(\theta)$, $\csc(\theta)$, $\cot(\theta)$ given the triangle pictured below:

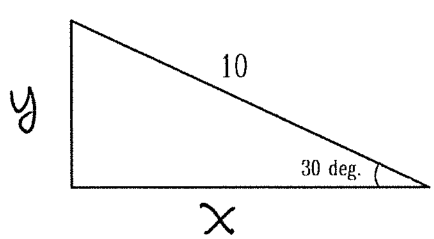
$\sqrt{6^2+8^2} = \sqrt{100} = 10$



$\sin\theta = \frac{8}{10}$ $\quad\cos\theta = \frac{6}{10}$ $\quad\tan\theta = \frac{8}{6}$

$\csc\theta = \frac{10}{8}$ $\quad\sec\theta = \frac{10}{6}$ $\quad\cot\theta = \frac{6}{8}$

7.) Find the lengths of the sides for the triangle pictured below; find the opposite side length and find the adjacent side length



$\cos(30) = \frac{x}{10} \Rightarrow x = 10\cos(30)$

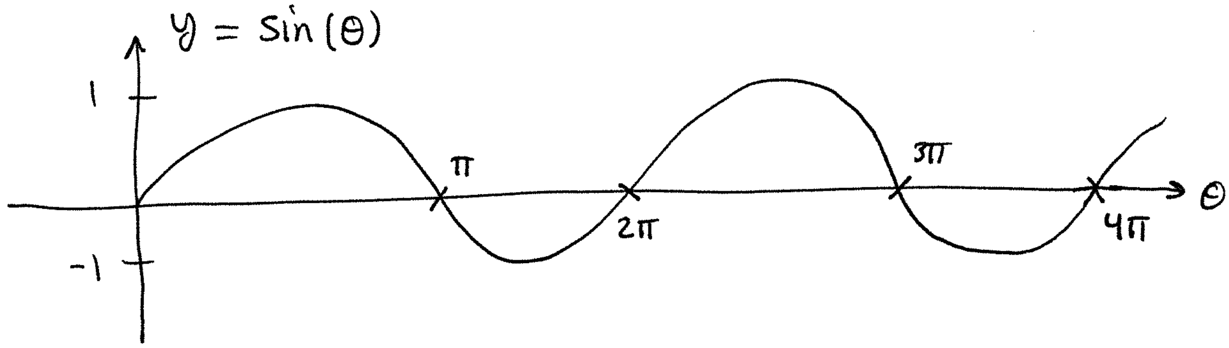
$\sin(30) = \frac{y}{10} \Rightarrow y = 10\sin(30)$

$\therefore\ x = 10 \cdot \frac{\sqrt{3}}{2} = \boxed{5\sqrt{3}}$

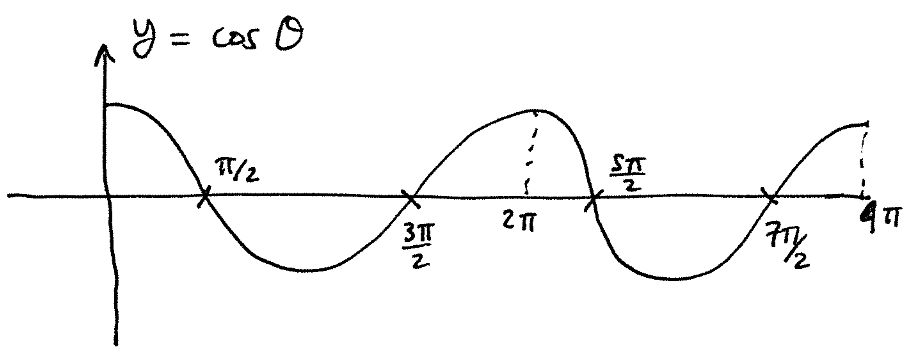
$y = 10\left(\frac{1}{2}\right) = \boxed{5}$

OPPOSITE SIDE LENGTH $= 5$
ADJACENT SIDE LENGTH $= 5\sqrt{3}$

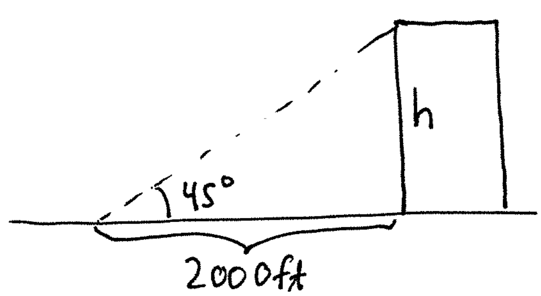
8.) Graph the sine function carefully for two whole cycles. Label your graph using radians.



9.) Graph the cosine function carefully for two whole cycles. Label your graph using radians.



10.) You are 2000ft away from the base of a tall building and you observe the angle inclination to the top of the building is 45 degrees. How tall is this building ?



$$\frac{h}{2000} = \tan(45^\circ) = 1$$

$$\therefore \boxed{h = 2000\text{ ft}}$$