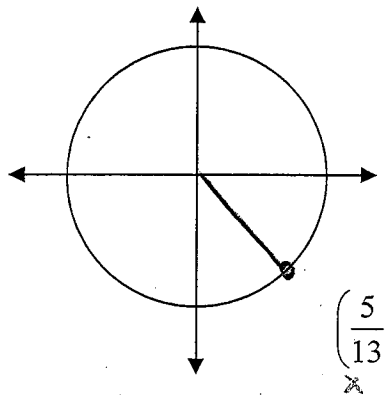
Pre-Calculus 4.1 – 4.3 REVIEW **NO CALCULATOR** Name: Key Hour:_____

Answer each question carefully. You MUST show work for full credit.

1-6. Given the point on the unit circle below, find all six trigonometric functions.



$\left(\frac{5}{13}, \frac{-12}{13}\right)$

x y

$\tan\theta = \frac{-12/13}{5/13} = \frac{-12}{\cancel{13}} \cdot \frac{\cancel{13}}{5} = \frac{-12}{5}$

$\sin\theta =$	$-12/13$
$\cos\theta =$	$5/13$
$\tan\theta =$	$-12/5$
$\csc\theta =$	$-13/12$
$\sec\theta =$	$13/5$
$\cot\theta =$	$-5/12$

7-11. Given that $\sin\theta = \frac{2}{3}$, $90^\circ < \theta < 180^\circ$, Find the exact value of each of the remaining trig functions.

QII cos is neg. sin is pos.

$\left(\frac{2}{3}\right)^2 + \cos^2\theta = 1$

$\frac{4}{9} + \cos^2\theta = 1$

$-\frac{4}{9} \qquad -\frac{4}{9}$

$\cos^2\theta = 1 - 4/9$

$\cos^2\theta = \frac{9}{9} - \frac{4}{9}$

$\sqrt{\cos^2\theta} = \sqrt{\frac{5}{9}}$

$\cos\theta = \frac{\sqrt{5}}{3}$

$\sec\theta = \frac{3}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \frac{3\sqrt{5}}{5}$

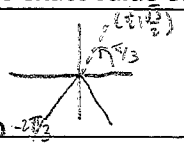
$\tan\theta = \frac{\frac{2}{3}}{\frac{\sqrt{5}}{3}} = \frac{2}{\cancel{3}} \cdot \frac{\cancel{3}}{\sqrt{5}} = \frac{2}{\sqrt{5}}$

$\frac{2}{\sqrt{5}}\left(\frac{\sqrt{5}}{\sqrt{5}}\right) = \frac{2\sqrt{5}}{5}$

$\sin\theta =$	$2/3$
$\cos\theta =$	$\sqrt{5}/3$
$\tan\theta =$	$\frac{2\sqrt{5}}{5}$
$\csc\theta =$	$3/2$
$\sec\theta =$	$\frac{3\sqrt{5}}{5}$
$\cot\theta =$	$\sqrt{5}/2$

#8-12: Find the exact value of each expression below.

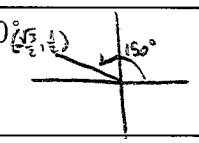
8. $\sin\left(-\frac{2\pi}{3}\right)$



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

9. $\sec 150^\circ$

$\frac{1}{\cos 150^\circ}$



$\frac{1}{-\frac{\sqrt{3}}{2}} = 1 \cdot \frac{2}{-\sqrt{3}} = \frac{2}{-\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{-2\sqrt{3}}{3}$

10. $\cos^2\frac{\pi}{9} + \sin^2\frac{\pi}{9} = 1$ $\quad \cos^2 + \sin^2 = 1$

11. $\tan^2 60^\circ - \sec^2 60^\circ$

-1

$\frac{\cos^2}{\cos^2} + \frac{\sin^2}{\cos^2} = \frac{1}{\cos^2}$

$1 + \tan^2 = \sec^2$

$-1 \quad -\sec^2 \quad -\sec^2 - 1$

$\tan^2 - \sec^2 = -1$

12. $6\tan\frac{\pi}{4} + \sin\frac{\pi}{3}\sec\frac{\pi}{6}$ All from unit circle

$6\left(\frac{\sqrt{2}}{2}\right) + \left(\frac{\sqrt{3}}{2}\right)\left(\frac{1}{\sqrt{3}/2}\right) = \frac{6\sqrt{2}}{2} + 1 = 3\sqrt{2} + 1$

#13-14: Find the co-function with the same value as the given expression

13. $\tan 13^\circ$

$\tan 13 = \cot(90 - 13)$

$\cot(77^\circ)$

14. $\cos\frac{2\pi}{5} = \sin\left(\frac{\pi}{2} - \frac{2\pi}{5}\right)$

$\sin\left(\frac{5\pi}{10} - \frac{4\pi}{10}\right) = \sin\frac{\pi}{10}$

Pre-Calculus 4.1 – 4.3 REVIEW **CALCULATOR** Name: Key Hour:_____

Answer each question carefully.

You MUST show work (neatly) for full credit.

Please circle your final answer(s).

15. Convert 125° to radians.

$125° * \frac{\pi}{180} = \frac{125\pi}{180} = \boxed{\frac{25\pi}{36}}$

16. Convert $\frac{-5\pi}{18}$ to degrees.

$\frac{-5\pi}{18} \cdot \frac{180}{\pi} = \frac{-5 \cdot 180}{18} = -50°$

#17-18 : Find one positive and one negative coterminal angle.
Your answer must be in the same form as the question.

17. $-380°$

$+360$

-20

-20

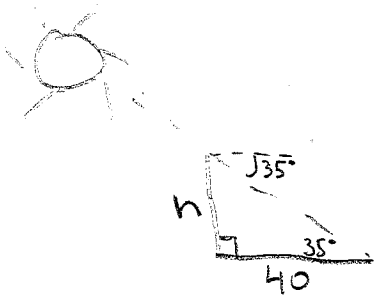
$+360$

$340°$

18. $\frac{7\pi}{10} + \frac{20\pi}{10} = \boxed{\frac{27\pi}{10}}$

$\frac{7\pi}{10} - \frac{20\pi}{10} = \boxed{\frac{-13\pi}{10}}$

19. At a certain time of day, the angle of elevation of the sun is 35 degrees. To the nearest foot, find the height of a tree whose shadow is 40 feet long.

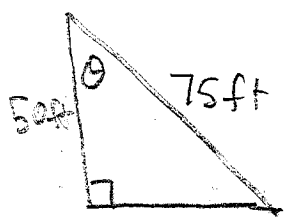


$40° \tan 35° = \frac{h}{40} \cdot 40$

$h \approx 28.01$ ft

$\boxed{28 \text{ ft}}$

20. A telephone pole is 50 feet tall. A guy wire 75 feet long is attached from the ground to the top of the pole. Find the angle between the wire and the pole to the nearest degree.



$\cos\theta = \frac{50}{75}$

$\theta = \cos^{-1}\left(\frac{50}{75}\right) = 48.19$

$48°$