

MAT170 Review Problems for Exam 3

Trigonometric Functions (Section 4.2)

- (a) Given that $\sin(t) = \frac{6}{7}$ and t is in quadrant II.
Find the exact value $\cos(t)$, $\tan(t)$, $\sec(t)$, $\csc(t)$, and $\cot(t)$.
- (b) Given that $\cos(t) = \frac{-3}{5}$ and t is in quadrant III.
Find the exact value $\sin(t)$, $\tan(t)$, $\sec(t)$, $\csc(t)$, and $\cot(t)$.

Applications (Section 4.3)

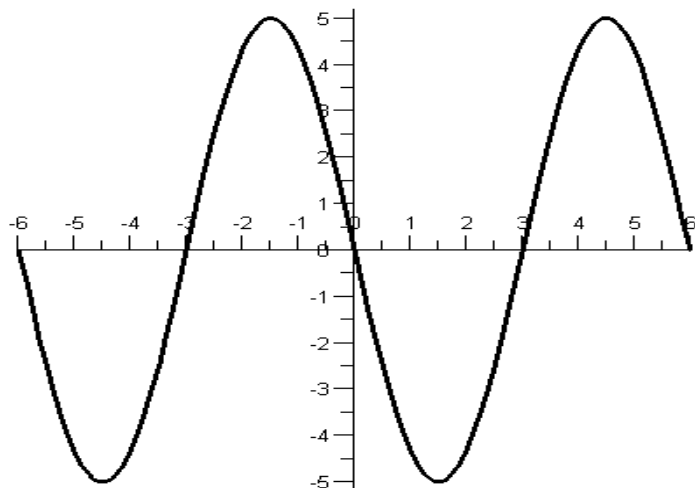
- A telephone pole is 55 feet tall. How long should a guy wire be if it to be attached 15 feet from the top and is to make an angle of 35° with the ground? Give your answer to the nearest tenth of a foot.
- A plane is flying at an altitude of 9000m. The pilot finds that the angle of depression to the airport is 20° . Find the distance between a point on the ground directly below the plane and the airport.

Reference Angle (Section 4.3)

- Find the reference angle for each of the following angles;
a) 210° b) -250° c) $\frac{23\pi}{4}$ d) $-\frac{13\pi}{3}$

Graphs of Trigonometric Functions (Section 4.5 - 4.6)

- (a) Given the function $y = -2\sin\left(2x + \frac{\pi}{2}\right)$ find the amplitude, period, and phase shift.
(b) Given the function $y = 4\cos(3x + \pi)$ find the amplitude, period, and phase shift.
- Find the equation for the graph shown below.



7. (a) Suppose $\sin(-t) = \frac{-1}{2}$ and $\cos(-t) = \frac{\sqrt{3}}{2}$, find $\tan(t)$
(b) Suppose $\sin(-t) = -0.32$ find $\csc(t)$.
8. (a) Graph the function $f(x) = 2 \sec(x)$ to determine the range of $f(x)$.
(b) Graph the function $g(x) = 3 \csc(x)$ to determine the range of $g(x)$.

Inverse Trigonometric Functions (Section 4.7)

Find the exact value of each of the following:

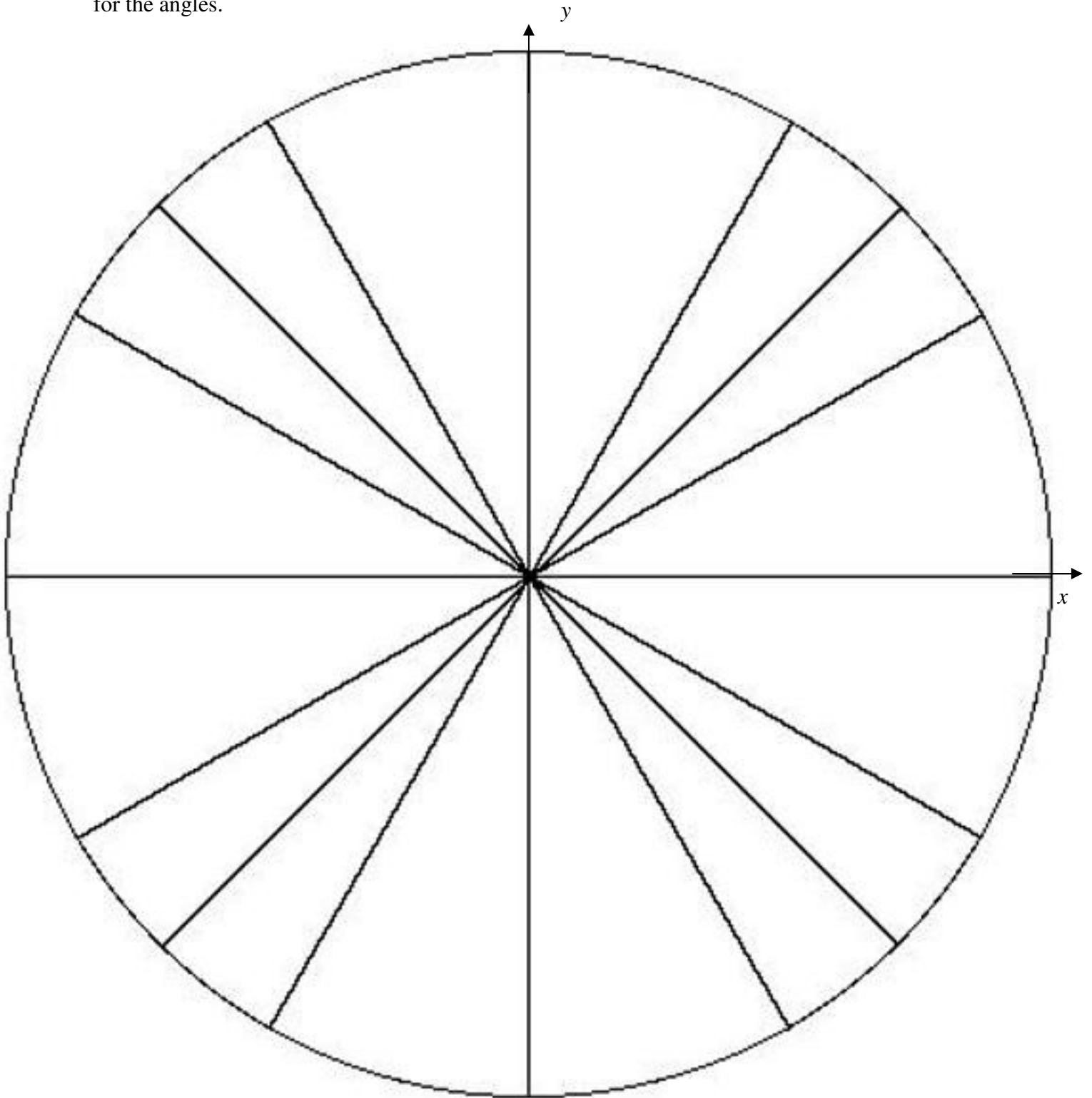
9. $\sin^{-1}\left(\frac{-\sqrt{3}}{2}\right)$ 10. $\cos\left[\tan^{-1}\left(\frac{2}{3}\right)\right]$ 11. $\tan(\cos^{-1} x)$
12. $\sin^{-1}\left[\sin\left(\frac{2\pi}{3}\right)\right]$ 13. $\cos^{-1}[\cos(135^\circ)]$ 14. $\sin^{-1}\left[\sin\left(\frac{7\pi}{6}\right)\right]$
15. $\cos\left(\sin^{-1}\left(\frac{x}{3}\right)\right)$ 16. $\tan(\sin^{-1}(3x))$

Verifying Trigonometric Identities (Section 5.1)

Verify each trigonometric identity:

17. $(\cos(\theta) - \sin(\theta))^2 + (\cos(\theta) + \sin(\theta))^2 = 2$
18. $\frac{\tan(\theta) \cdot \cot(\theta)}{\csc(\theta)} = \sin(\theta)$ 19. $\tan(\theta) + \frac{\cos(\theta)}{1 + \sin(\theta)} = \sec(\theta)$
20. $\cot(x) + \tan(x) = \sec(x) \csc(x)$ 21. $(\sec(x) - \tan(x))^2 = \frac{1 - \sin(x)}{1 + \sin(x)}$
22. $\frac{1 - \cot(x)}{\cos(x)} = \sec(x) - \csc(x)$

23. (**Section 4.2**) Label the unit circle, i.e. label all the special angles, and the x and y coordinates for the angles.



Sum and Difference Formulas (Section 5.2)

24. Find the exact value of the expression: $\cos \frac{5\pi}{12} \cos \frac{\pi}{12} + \sin \frac{5\pi}{12} \sin \frac{\pi}{12}$

25. Find the exact value of the expression: $\cos(135^\circ + 30^\circ)$

26. Find the exact value of the expression: $\frac{\tan \frac{\pi}{5} - \tan \frac{\pi}{30}}{1 + \tan \frac{\pi}{5} \tan \frac{\pi}{30}}$

27. Verify the identity: $\cos\left(x - \frac{\pi}{2}\right) = \sin x$