

Problem Set 11

1. An object is traveling around a circle of radius 43 m. It completes a cycle in 17 seconds.
 - (a) Find the linear speed of the object.
 - (b) If it starts at $P(0, 43)$, find its coordinates after 5 minutes.
 - (c) Find the angle in radians that the object travels through in 1 second.
2. Convert 37.258° to degree-minute-second measure. Round your second measure to the nearest integer.
3. Find the exact value for each of the following expressions.
 - (a) $\cos 690^\circ \sin(-30^\circ) + \tan 420^\circ =$
 - (b) $\tan \frac{7\pi}{4} - \cos \frac{5\pi}{3} \left(\sin \frac{5\pi}{6} \right) =$
 - (c) $\sin \frac{11\pi}{3} - \cot \frac{11\pi}{4} + \cos \frac{11\pi}{6} =$
4. Find the exact value of all solutions of each of the following equations. Present your answer in radians.
 - (a) $\sin x = -\frac{\sqrt{3}}{2}$
 - (b) $\tan 2x = -1$
 - (c) $2 \cos^2 x - 3 \cos x = 2$
 - (d) $\cos^2 x = 2 + 2 \sin x$
5. True or false?
 - (a) An angle and its opposite have the same cosine.
 - (b) An angle and its opposite have the same sine.
 - (c) If α is any angle in radians and k is any integer, then $\tan \alpha = \tan(\alpha + k\pi)$
6. Let F be a two-dimensional force. Suppose that $F = (300 \text{ N}, 28^\circ)$
 - (a) Find F_x , the horizontal component of F .
 - (b) Find F_y , the vertical component of F .
7. Prove each of the following identities.
 - (a) $1 - 2 \cos^2 x = \frac{\tan^2 x - 1}{\tan^2 x + 1}$
 - (b) $\sec x + \tan x = \frac{\cos x}{1 - \sin x}$
 - (c) $\sin^4 x - \cos^4 x = 1 - 2 \cos^2 x$
8. Use the identity $\sin(\alpha + \beta) = \sin \alpha \cos \beta + \cos \alpha \sin \beta$ to find the formula for $\sin 2\alpha$.