The Weekly Rigor
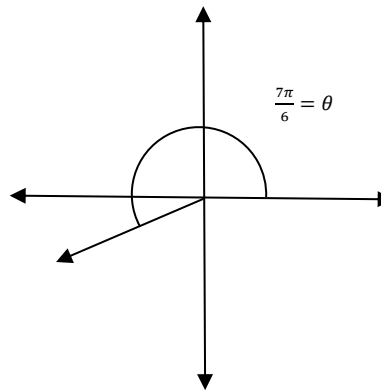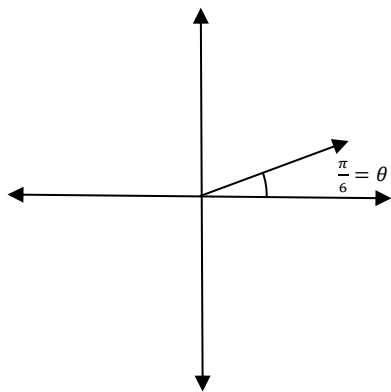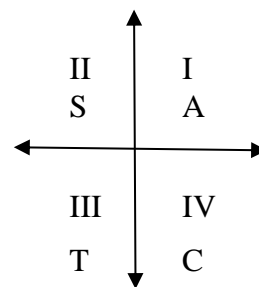
28 Problems Solving Simple Trigonometric Equations (Type III)
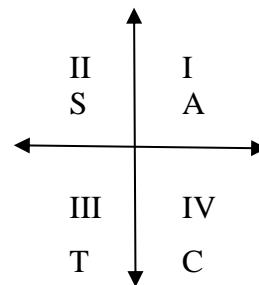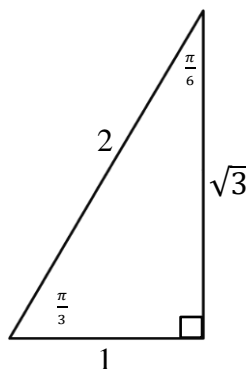### (Part 2)

SELECTED SOLUTIONS

1. $3\tan(\theta) - \sqrt{3} = 0 \implies \tan(\theta) = \frac{1}{\sqrt{3}}$. Consulting the 30-60-90 reference triangle,
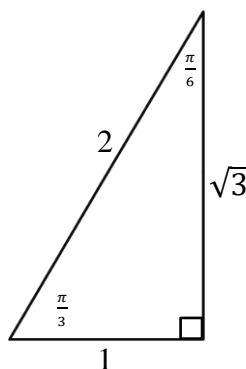
we see that $\tan\left(\frac{\pi}{6}\right) = \frac{1}{\sqrt{3}}$. Hence, θ_R, the reference angle for θ, is $\frac{\pi}{6}$.
But tangent is positive in Quadrants I and III. Therefore, $\theta = \frac{\pi}{6}$ (QI)
and $\theta = \pi + \theta_R = \pi + \frac{\pi}{6} = \frac{7\pi}{6}$ (QIII).

19. $\tan^2(\theta) - 3 = 0 \implies \tan^2(\theta) = 3 \implies \tan(\theta) = \pm\sqrt{3} = \pm\frac{\sqrt{3}}{1}.$
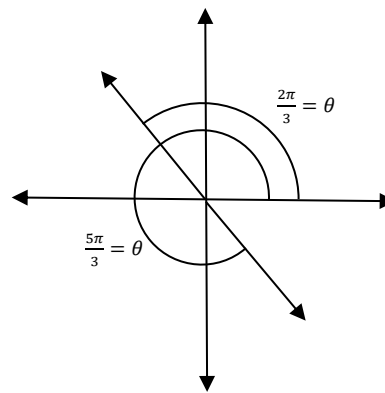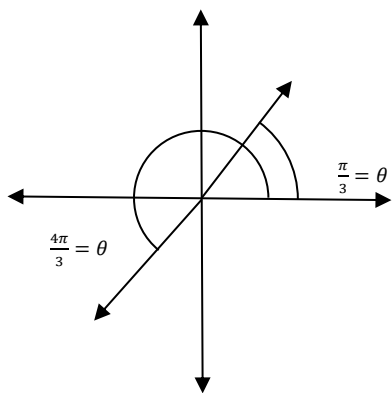Consulting the 30-60-90 reference triangle,

we see that $\tan\left(\frac{\pi}{3}\right) = \frac{\sqrt{3}}{1}$. Hence, θ_R, the reference angle for θ, is $\frac{\pi}{3}$.
But tangent is positive in Quadrants I and III. Therefore, $\theta = \frac{\pi}{3}$ (QI)
and $\theta = \pi + \theta_R = \pi + \frac{\pi}{3} = \frac{4\pi}{3}$ (QIII). Furthermore, tangent is
negative in Quadrants II and IV. Therefore, $\theta = \pi - \theta_R = \pi - \frac{\pi}{3} = \frac{2\pi}{3}$ (QII)
and $\theta = 2\pi - \theta_R = 2\pi - \frac{\pi}{3} = \frac{5\pi}{3}$ (QIV).