TRIGONOMETRY REVIEW

Unit Circle

\[ \text{Arc length } (S) = r \theta \]

\[ \text{Area of a Segment } (A) = \frac{1}{2} r^2 \theta \]

Special Triangles

30°, 60°, 90°

45°, 45°, 90°

Circumference of a Circle

\[ C = 2\pi r \]

Circumference of the Unit Circle

\[ C_u = 2\pi (1) \]

Note: the radius of the Unit Circle is 1. \( \therefore C_u = 2\pi \)

Recall:

\[ y = \tan \theta \]

\[ y = \cot \theta \]

\[ y = \sec \theta \]

\[ y = \csc \theta \]

Recall:

\[ \cos^2 \theta + \sin^2 \theta = 1 \]  
[Pythagorean Theorem]

\[ \sec^2 \theta - \tan^2 \theta = 1 \]

\[ \csc^2 \theta - \cot^2 \theta = 1 \]
Recall:

* \[ \csc \theta = \frac{1}{\sin \theta} \]
* \( \frac{\theta}{\theta} = \text{undefined} \)

**E1**

Graph \( \sin (2\theta - \frac{\pi}{2}) + 1 \)

\[ 0 \leq 2\theta - \frac{\pi}{2} \leq 2\pi \]
\[ \frac{\pi}{2} \leq \theta \leq \frac{5\pi}{2} \]

\[ \frac{\pi}{4} \leq \theta \leq \frac{5\pi}{4} \] period

**E2**

Section Appendix B, #7.

\[ \tan \theta = 3 \]
Identify all trig functions of \( \theta \).

\[ \sin \theta = \frac{2}{\sqrt{10}} \]
\[ \cos \theta = \frac{1}{\sqrt{10}} \]
\[ \csc \theta = \frac{\sqrt{10}}{2} \]
\[ \sec \theta = \sqrt{10} \]
\[ \tan \theta = 3 \]
\[ \cot \theta = \frac{1}{3} \]

**E3**

Appendix B, #15d.

\[ \tan \theta = -\frac{1}{\sqrt{3}} \]
\[ -\frac{\pi}{2} < \theta < 0 \]

\[ (\frac{3}{2})^2 + (\frac{1}{2})^2 = c^2 \]
\[ c = \sqrt{2} \]

\[ \tan \theta = -\frac{1}{\sqrt{3}} \]
\[ \cot \theta = -\sqrt{3} \]

**E4**

Appendix B, #27.

\[ \csc \theta = \frac{2}{\sqrt{3}} \]

\[ \sin \theta = \frac{\sqrt{3}}{2} \]
\[ \theta = \frac{\pi}{3} \pm 2\pi n \]
\[ \theta = \frac{2\pi}{3} \pm 2\pi n \]

Note: \( \tan \theta = 3 \)

Using SOH-CAH-TOA we are able to draw a triangle and use the pythagorean theorem to find the missing side.

Inside triangle signifies first quadrant. Recall the boundaries of \( \tan \theta \) is

\[ -\frac{\pi}{2} < \theta < \frac{\pi}{2} \]

\( \tan \theta \) must be in the first quadrant since its positive.

\[ \frac{\sqrt{2}}{3} \]

However, in [E2] \( \tan \theta = -\frac{1}{\sqrt{3}} \), so it is safe to assume that \( \tan \theta \) is in the 4th quadrant.