

The Weekly Rigor

No. 258

“A mathematician is a machine for turning coffee into theorems.”

June 1, 2019

16 Problems Concerning the Unit Circle (Part 1 of 2) (Part 1)

PROBLEMS

Evaluate the trigonometric function of the given quadrant angle. Show how you found your answer, including a picture of the four special points on the unit circle associated with the quadrant angles 0 , $\frac{\pi}{2}$, π , and $\frac{3\pi}{2}$ in the x - y plane. For the trigonometric functions secant, cosecant, tangent, and cotangent, make explicit their connection to sine and cosine.

1. $\cos(0)$

2. $\sin(0)$

3. $\cos(\pi)$

4. $\sin(\pi)$

5. $\cos\left(\frac{\pi}{2}\right)$

6. $\sin\left(\frac{\pi}{2}\right)$

7. $\cos\left(\frac{3\pi}{2}\right)$

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

9. $\sec(0)$

10. $\sec(\pi)$

11. $\csc\left(\frac{\pi}{2}\right)$

12. $\csc\left(\frac{3\pi}{2}\right)$

13. $\tan(0)$

14. $\tan(\pi)$

15. $\cot\left(\frac{\pi}{2}\right)$

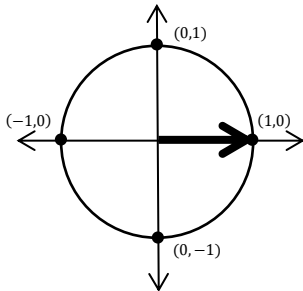
16. $\cot\left(\frac{3\pi}{2}\right)$

ANSWERS

1. 1	2. 0
3. -1	4. 0
5. 0	6. 1
7. 0	8. -1
9. 1	10. -1
11. 1	12. -1
13. 0	14. 0
15. 0	16. 0

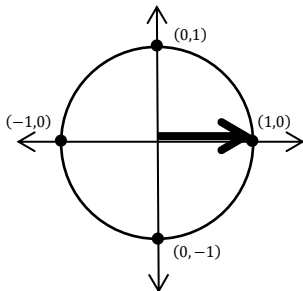
SELECTED SOLUTIONS

1. $\cos(0)$



For any angle θ in standard position and its corresponding point (x, y) on the unit circle, $(\cos(\theta), \sin(\theta)) = (x, y)$. Hence, for $\theta = 0$, $\cos(0) = 1$.

2. $\sin(0)$



For any angle θ in standard position and its corresponding point (x, y) on the unit circle, $(\cos(\theta), \sin(\theta)) = (x, y)$. Hence, for $\theta = 0$, $\sin(0) = 0$.

“Only he who never plays, never loses.”