

This quiz reviews some basic trigonometry needed in Calculus II. You may work this quiz either:

- (1) on your own paper, in which case, box your answer and show your work
- (2) on this paper, in which case, put your answer in the provided box and justify your answer by showing your work beneath the box.

1. We know that

$$1 \quad \& \quad \cos \theta \quad \& \quad \sin \theta$$

satisfies the well-known equation

$$\cos^2 \theta + \sin^2 \theta = 1 . \quad (1)$$

DERIVE a similar equation (which you will need to know) relating

$$1 \quad \& \quad \tan \theta \quad \& \quad (\text{one other trigonometric function})(\theta) .$$

ANSWER:¹

2. Express $\arctan \sqrt{3}$ in radians.

ANSWER:² $\arctan \sqrt{3} =$

3. Express $\arctan (-\sqrt{3})$ in radians.

ANSWER:² $\arctan (-\sqrt{3}) =$

¹Justify your answer beneath the box. To Derive \neq to look up in a book. Start with the well-known equation in (1) and perform a few algebraic steps to quickly arrive at an equation involving \tan . Would you rather memorize this need-to-know equation or just remember how to quickly derive it from the well-known equation (1)? Just for fun: in this problem replace \tan with \cot and give it a try.

²Justify your answer beneath the box, e.g., a properly marked reference triangle or an explanation of how you see it from a properly marked unit circle.

4. Let $x = 5 \sec \theta$ and $0 < \theta < \frac{\pi}{2}$.

Without using inverse trigonometric functions, express $\tan \theta$ as a function of x .

ANSWER:³ $\tan \theta =$

5. Let $x = 5 \sec \theta$ and $\frac{\pi}{2} < \theta < \pi$.

Without using inverse trigonometric functions, express $\tan \theta$ as a function of x .

ANSWER:³ $\tan \theta =$

³Justify your work either by some algebra or by a properly marked unit circle/reference triangle, along with a brief explanation of what you are thinking.

6. Let $u = 5 \tan \theta$. Without using inverse trigonometric functions, fill out the below chart to express $\sin \theta$ as a function of u .

$$\text{ANSWER : } \sin \theta = \begin{cases} \boxed{} & \text{;if } 0 \leq \theta < \frac{\pi}{2} \\ \boxed{} & \text{;if } \frac{\pi}{2} < \theta < \pi \\ \boxed{} & \text{;if } \pi \leq \theta < \frac{3\pi}{2} \\ \boxed{} & \text{;if } \frac{3\pi}{2} < \theta < 2\pi. \end{cases}$$

Hint: For each quadrant, compare the sign (i.e., positive or negative) of $\sin \theta$ with the sign of $\tan \theta$.