Our project title

The authors

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1 Introduction to the functions

1.1 The tangent function

The tangent function is one of the six trigonometric functions. It has many important uses in real life calculations such as calculating the slope of straight lines, angles of elevation and depression [1], rate of altitude change of an aircraft [2] etc.
The tangent function can be understood from an unit circle(a circle whose radius = 1).

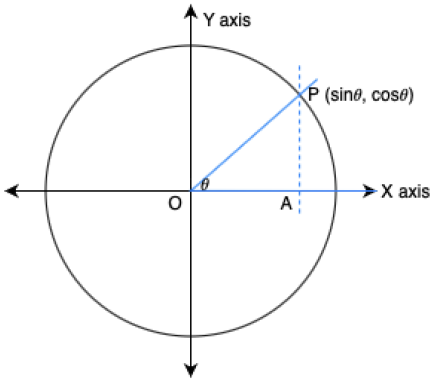

Figure 1: A unit circle

In a unit circle we take two lines originating from the center, one along the positive x axis and the other line intersecting the circumference of the circle. From the definition of unit circle, the coordinate of the point at which the circumference is intersected is $(\sin\theta, \cos\theta)$ [3] and the tangent of the angle θ is:

$$\tan(\theta) = \sin(\theta) \div \cos(\theta) \tag{1}$$

The domain of $\tan\theta$ is x $\in R$, x $\neq (\pi/2) + n^*\pi$ and its codomain is (-∞, ∞) [4].

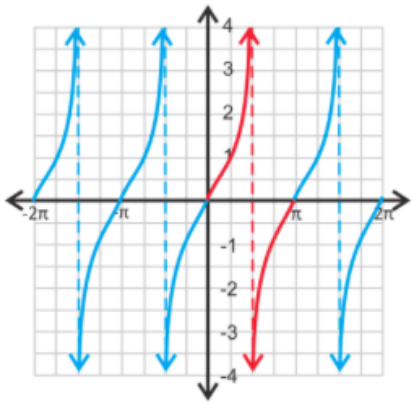

Figure 2: Graph of tangent function

The graph of the tangent function has some interesting properties. As $\cos\theta = 0$ when $\theta = \pm(n\pi/2)$ where n is odd, the graph approaches an asymptote along y-axis as $\cos\theta$ approaches 0. Moreover, the graph has no amplitude and the period is calculated as the distance between any two high points or low points at the same height and the period is π. The graph intersects the y-axis only at (0,0) and the x-axis for $\theta = n\pi$.

References

[1] "Tangents and slopes." https://www2.clarku.edu/faculty/djoyce/trig/tangents.html. Accessed: 2021-07-22.

[2] https://math.stackexchange.com/questions/755083/real-world-tangent-functions. Accessed: 2021-07-22.

[3] https://en.wikipedia.org/wiki/Unit_circle. Accessed: 2021-07-22.

[4] https://www.varsitytutors.com/hotmath/hotmath_help/topics/graphing-tangent-function. Accessed: 2021-07-22.