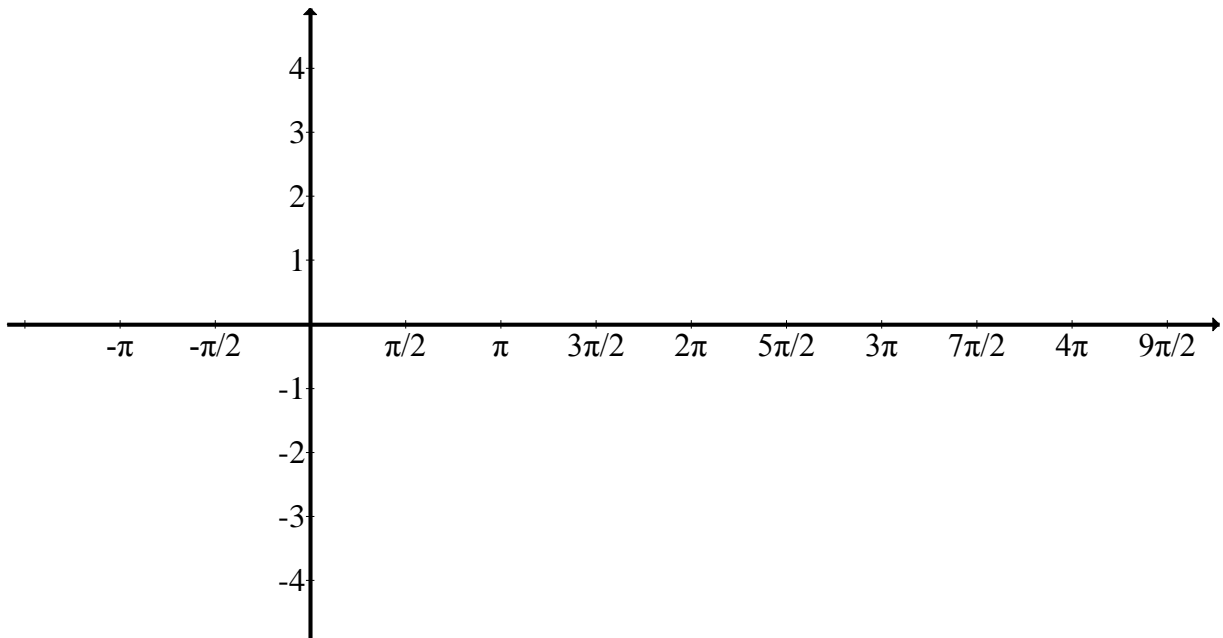


Please show your work, circle your answer, and round all decimals to two decimal places.

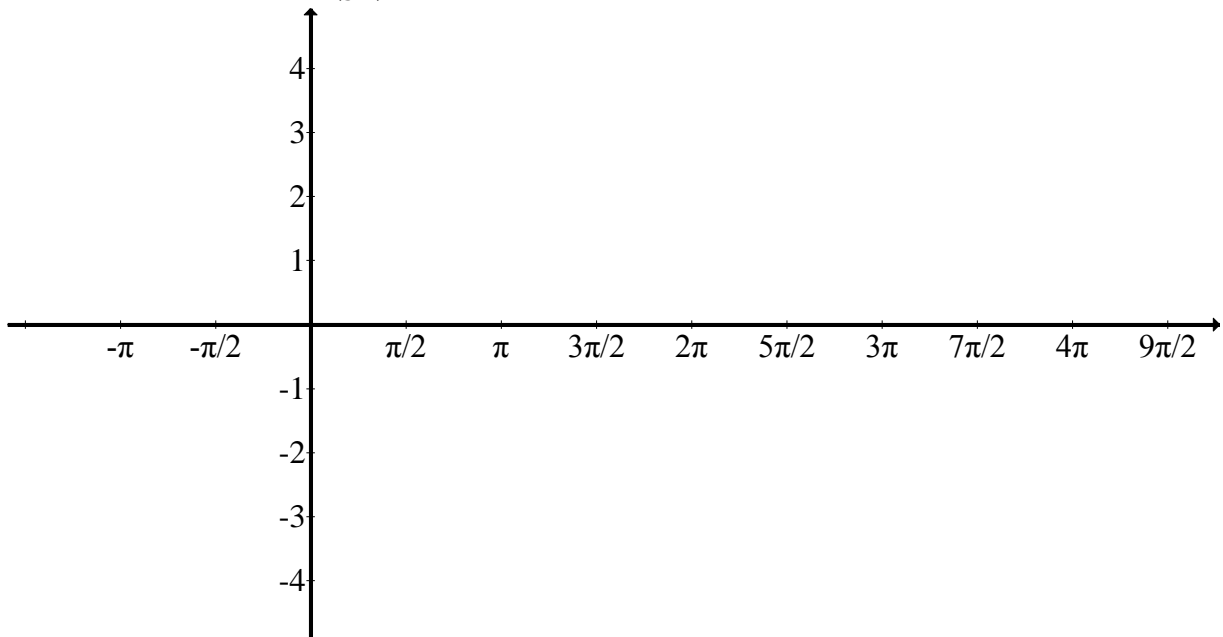
No calculators are allowed. When graphing a function:

- Graph as much of the function as the axis provides.
- Identify which graph is your answer if you have multiple graphs on the given axis.
- Use dotted lines to denote any asymptotes (if applicable).

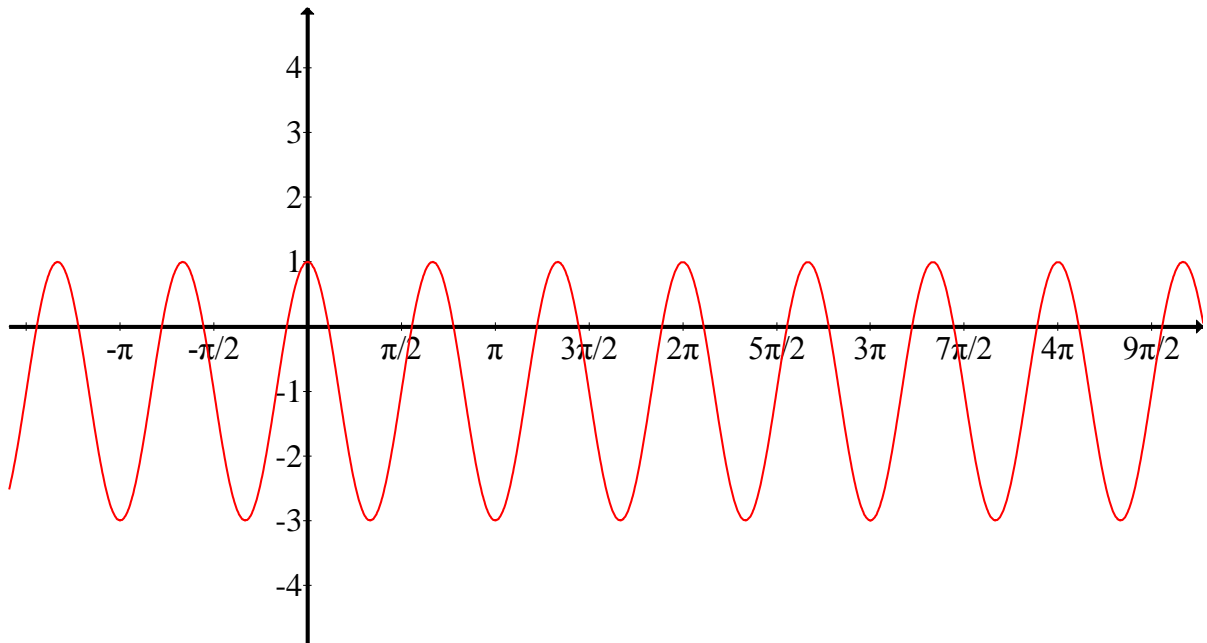
1) Graph the function $y = \sin\left(x - \frac{\pi}{2}\right) + 3$. (10 points)



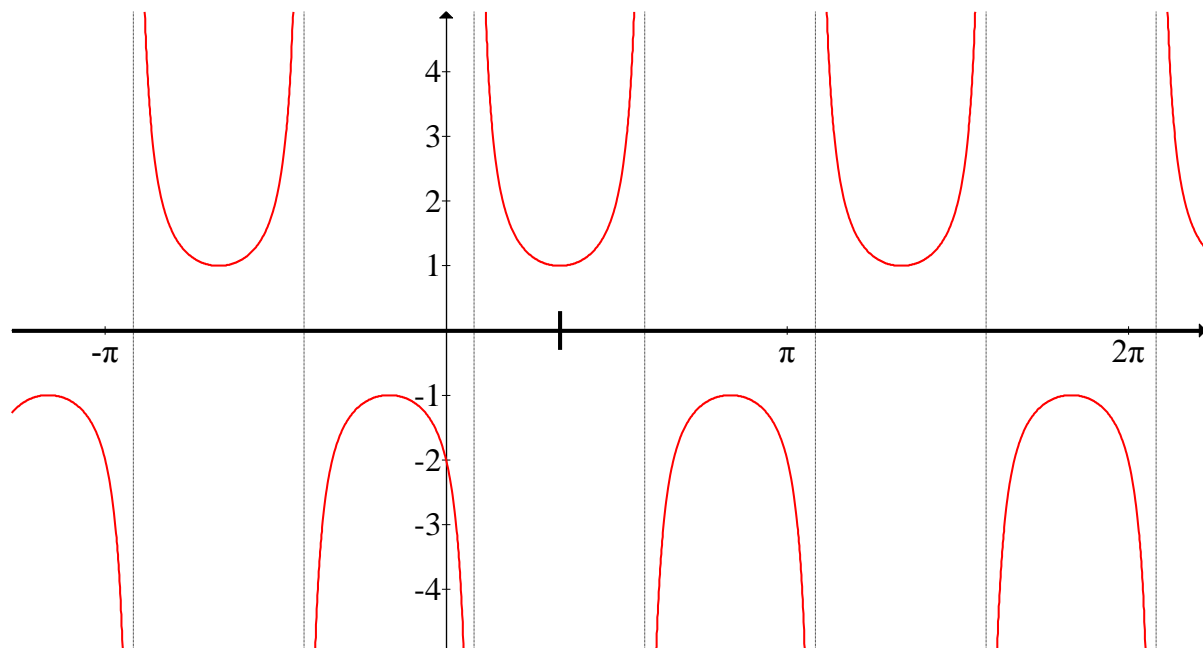
2) Graph the function $y = \tan\left(\frac{1}{3}x\right)$. (10 points)



3) Find an equation for the graph shown below. (10 points)



4) Label the giant tick mark on the x-axis, then find an equation for the graph shown. (10 points)



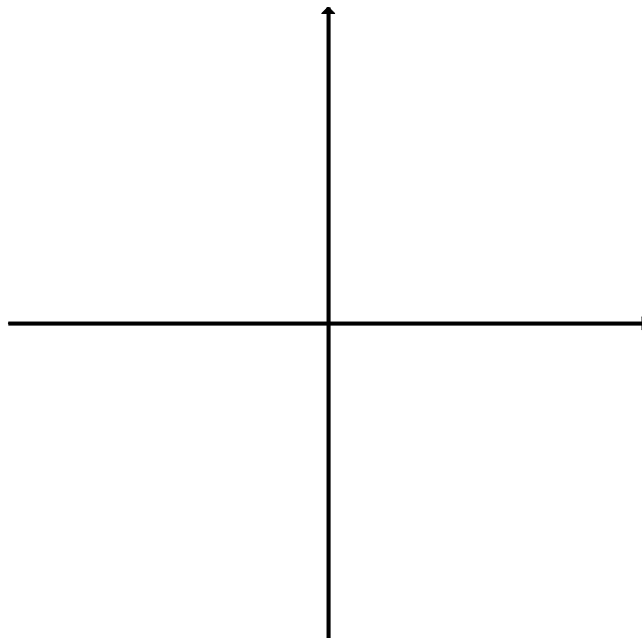
5) Find an equation for an asymptote of $y = \csc(x)$. (5 points)

6) The period of our moon is 28 days. If Dr. Evil uses his "Evil Ray" to reduce the period to 14 days, describe how its speed changes. (5 points)



7) Find $\cos\left(\frac{7\pi}{3}\right)$. Note that the next problem will illustrate this. (3 points)

8) Illustrate your answer to the previous question by drawing and labeling a diagram on the axis below. (7 points)



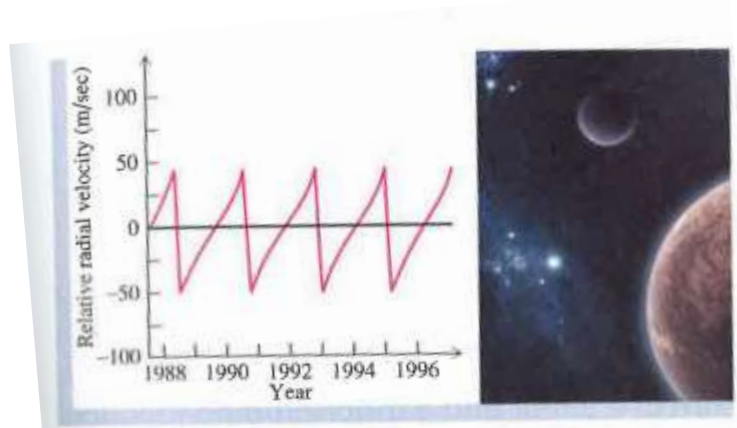
9) For the past 7 years, a manager of “Bucks Beefy Burgers” has noticed that the utility bill reaches its maximum at \$600 in January, and then decreases gradually to a minimum of \$400 during the summer. After that it continues to increase until reaching \$600 again the following January.

(a) What is the period of the utility bill at Bucks Beefy Burgers? (5 points)

(b) What is the amplitude of the utility bill at Bucks Beefy Burgers? (5 points)

10) With some rather bizarre but creative science and math, astronomers used the “wobble” depicted here to discover a star.

(a) What is the period of the wobble? (5 points)



(b) Should the wobble be modeled with a sine graph? If so, find the equation of the sine function. (5 points)

11) Simplify the expression shown below. (5 points)

$$\sin(x) + \frac{\cos^2(x)}{\sin(x)}$$

12) Simplify the expression shown below. (5 points)

$$\frac{5}{7} + \frac{2}{3}$$

13) Find all the missing side lengths and angles on the triangle shown below. (10 points)

