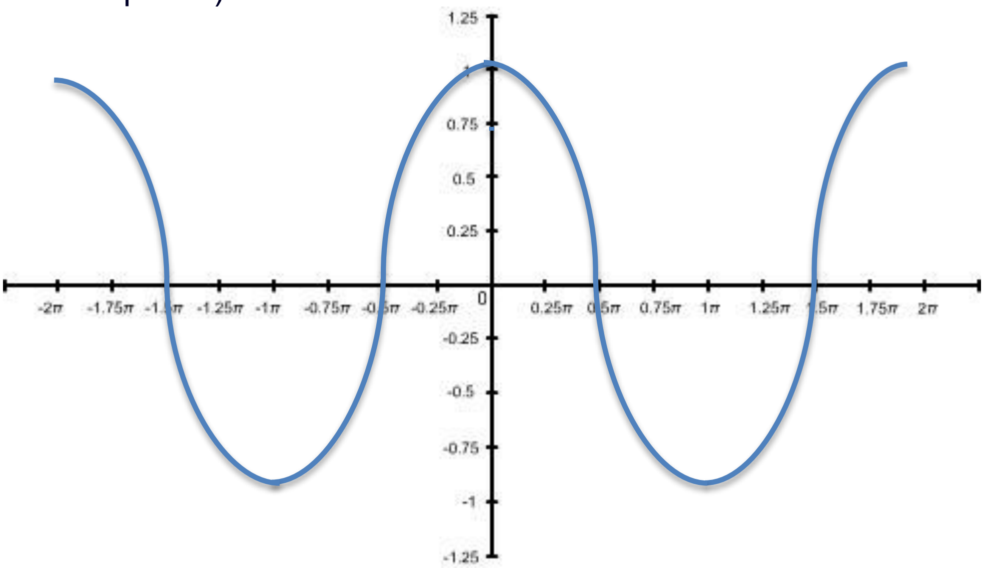
Sample: Trigonometry - Properties of Trigonometric Functions

1 Math Homework.

Complete your assignment and submit it to your instructor. Fill in the following table for *f*(*x*) = cos(*x*) (each blank in the table is worth 1 point):

x	-2π	-3π/2	- π	- π/2	0	π/2	π	3π/2	2 π
cos(x)	1	0	-1	0	1	0	-1	0	1

Graph the two periods of the cosine function from the table (graph is worth 9 points):



Fill in the following properties of the graph of the cosine function. To receive full credit for each question, you must explain your answer (each problem is worth 2 points):

1. Domain of *f*(*x*) = cos(*x*).

Domain of f(x)=cos(x) is $(-\infty, \infty)$, because argument x can take on any real value.

2. Range of *f*(*x*) = cos(*x*).

Range f(x)=cos(x) is [-1,1], because cos(x) always less or equal then 1 and greater or equal then -1.

3. Period of *f*(*x*) = cos(*x*).

Period of f(x)=cos(x) is 2π , because 2π is the smallest value p for which $cos(x + p) = cos(x)$ for all x.

4. The x-intercepts of *f*(*x*) = cos(*x*) .

The x-intercepts of *f*(*x*) = cos(*x*) are $x = \frac{\pi}{2} + \pi n$ where n is an integer (positive or negative), because cos($\frac{\pi}{2} + \pi n$)=0.

5. The y-intercept of *f*(*x*) = cos(*x*).

The y-intercept of $f(x) = \cos(x)$ is 1 because cos(0)=1.

6. Max and Min Values of $f(x) = \cos(x)$

Max Value of $f(x) = \cos(x)$ is 1.

Min Value of $f(x) = \cos(x)$ is -1

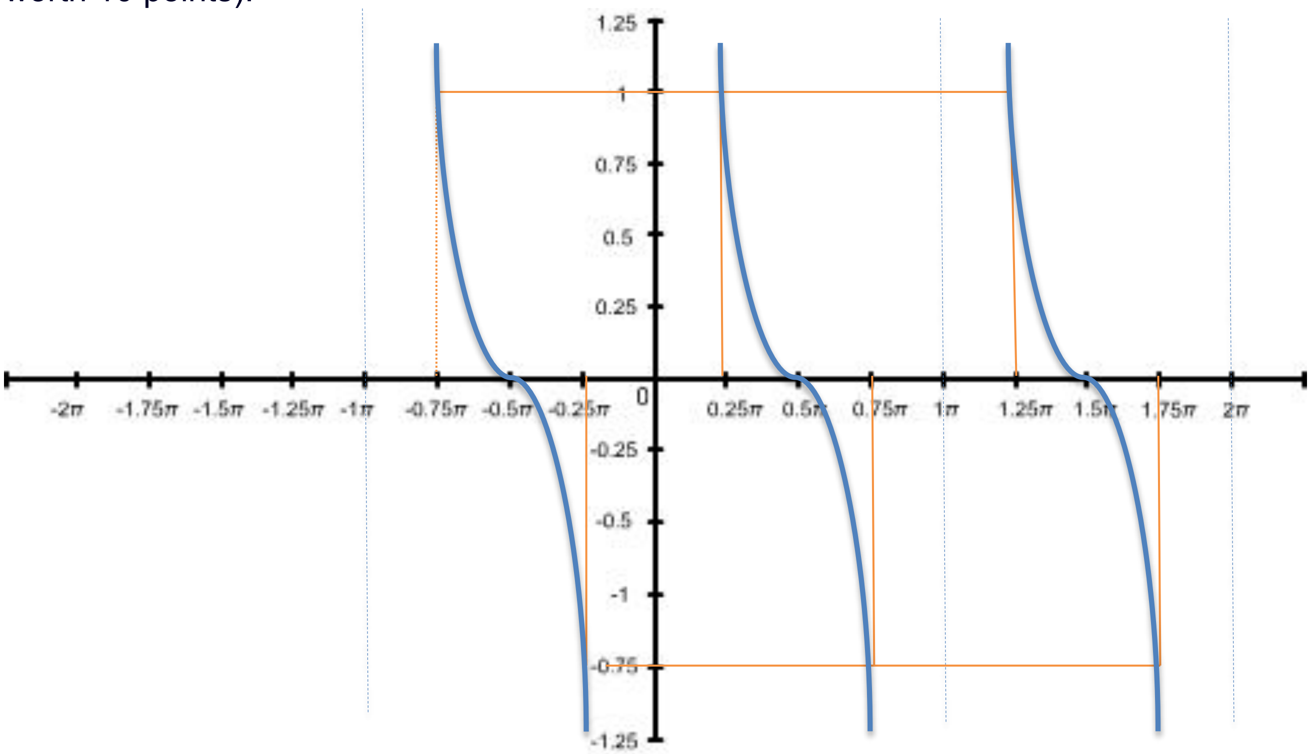
because cos(x) is less or equal then 1 and greater or equal then -1 for all x.

2 Math Homework.

Complete your assignment and submit it to your instructor. Fill in the following table for $f(x) = \cot(x)$ (each blank in the table is worth 1 point):

x	$-\pi$	$-\frac{3\pi}{4}$	$-\frac{\pi}{2}$	$-\frac{\pi}{4}$	0	$\frac{\pi}{4}$	$\frac{\pi}{2}$	$\frac{3\pi}{4}$	π	$\frac{5\pi}{4}$	$\frac{3\pi}{2}$	$\frac{7\pi}{4}$	2π
cot(x)	-∞, ∞	1	0	-1	-∞, ∞	1	0	-1	-∞, ∞	1	0	-1	-∞, ∞

Graph the three periods of the cotangent function from the table (graph is worth 10 points):



Fill in the following properties of the graph of the cotangent function. To receive full credit on each question, you must explain your answer (each problem is worth 2 points):

1. Domain of *f*(*x*) = cot(*x*).
Domain of f(x)=cot(x): $\{x \in R: \pi n < x < \pi(n+1) \text{ and } n \in Z(\text{integer})\}$, because cot(x) is undefined for x= πn

2. Range of *f*(*x*) = cot(*x*).
Range of *f*(*x*) = cot(*x*) is all real numbers

3. Period of *f*(*x*) = cot(*x*).
Period of f(x)=cot(x) is π , because π is the smallest value p for which $cot(x+p) = cot(x)$ for all x.

4. The x-intercepts of *f*(*x*) = cot(*x*).
The x-intercepts of *f*(*x*) = cot(*x*) are $x = \frac{\pi}{2} + \pi n$ where n is an integer (positive or negative), because cot($\frac{\pi}{2} + \pi n$)=0.

5. The y-intercept of *f*(*x*) = cot(*x*).
The y-intercept of *f*(*x*) = cot(*x*) does not exist.

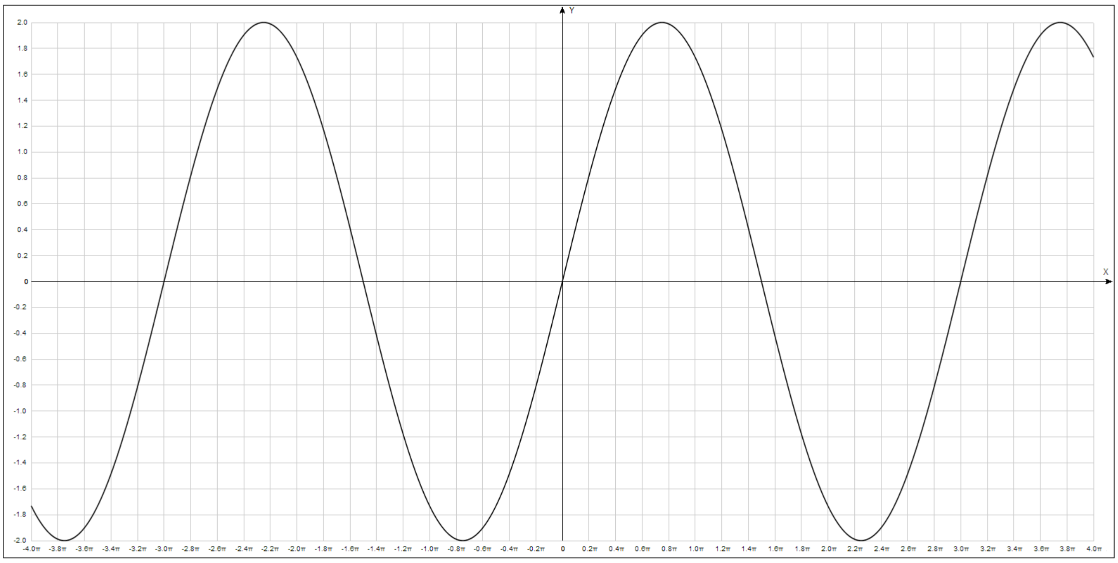
6. Asymptotes of *f*(*x*) = cot(*x*).
Vertical asymptotes of *f*(*x*) = cot(*x*) are $x = \pi n$ (where n is integer).

3 Math Homework.

Make sure to show all your work.

1. Graph $f(x) = 2\sin(\frac{2}{3}x)$. Find the amplitude and period of the function.

$y = 2\sin(2x/3)$



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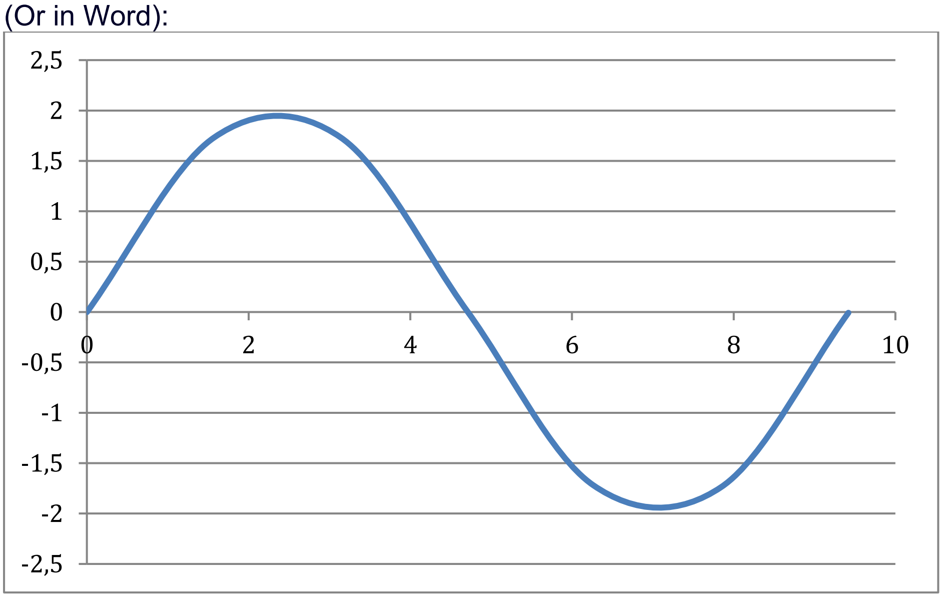
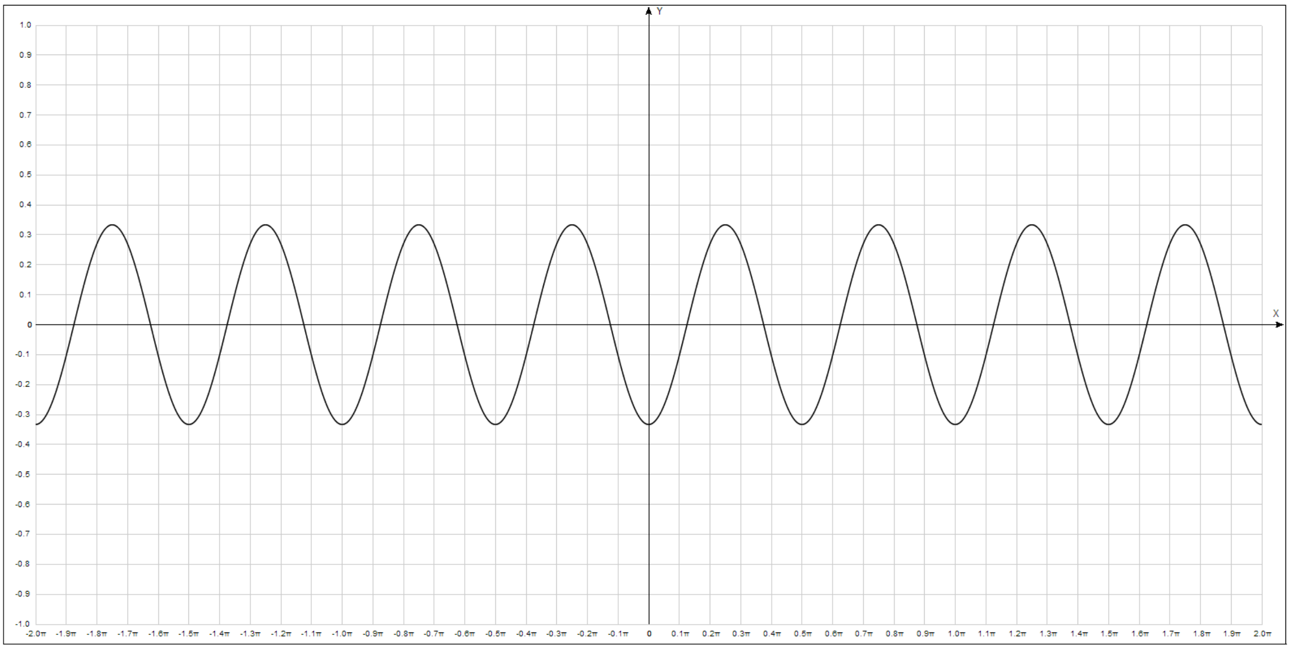


The amplitude of function $f(x) = \sin(x)$ equals 1 so in our case amplitude of function $f(x) = 2\sin(2x/3)$ equals 2.

Period of function $f(x) = \sin(x)$ equals 2π so in our case period of function $f(x) = 2\sin(2x/3)$ equals $\frac{2\pi}{\frac{2}{3}} = 3\pi$

2. Graph $f(x) = -\frac{1}{3}\cos(4x)$. Find the amplitude and period of the function.



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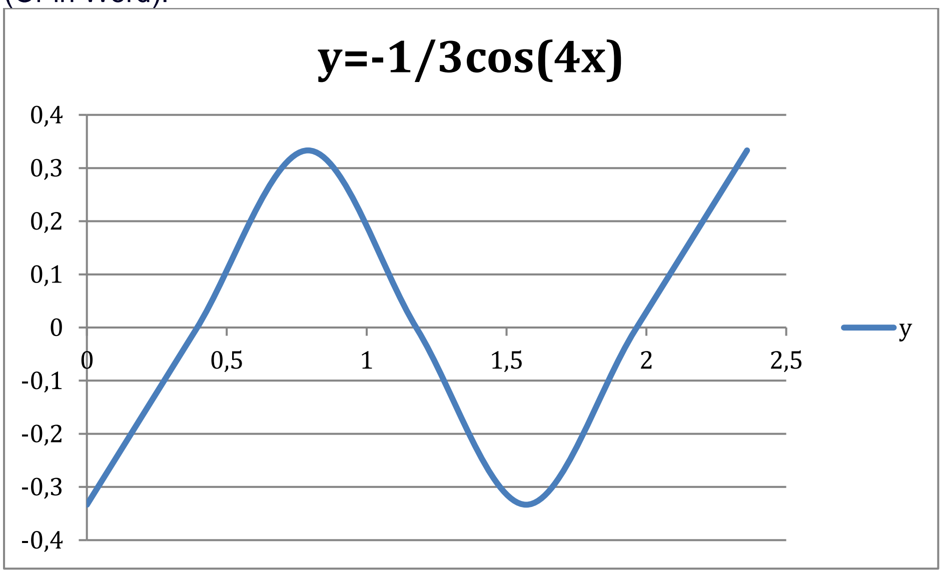
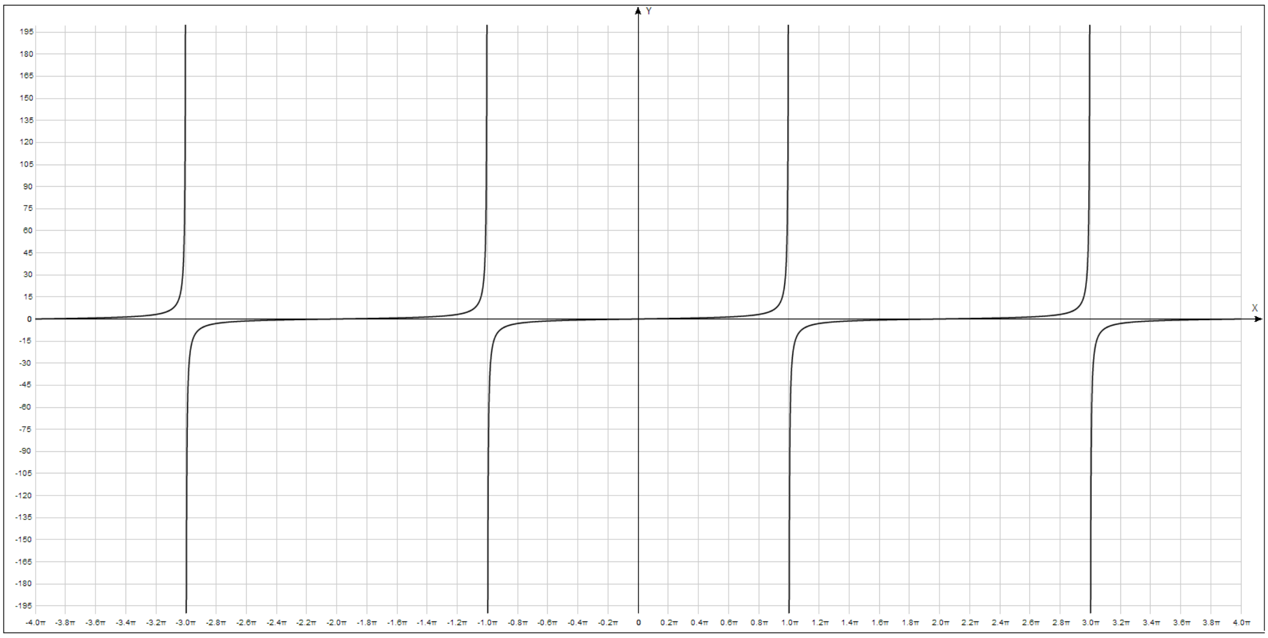


The amplitude of function $f(x) = \cos(x)$ equals 1 so in our case amplitude of function $f(x) = -1/3\cos(4x)$ equals 1/3.
Period of function $f(x) = \cos(x)$ equals 2π so in our case period of function $f(x) = -1/3cos(4x)$ equals $\frac{2\pi}{4} = \frac{\pi}{2}$

3. Graph $f(x) = \tan(\frac{1}{2}x)$. Find the amplitude and period of the function.



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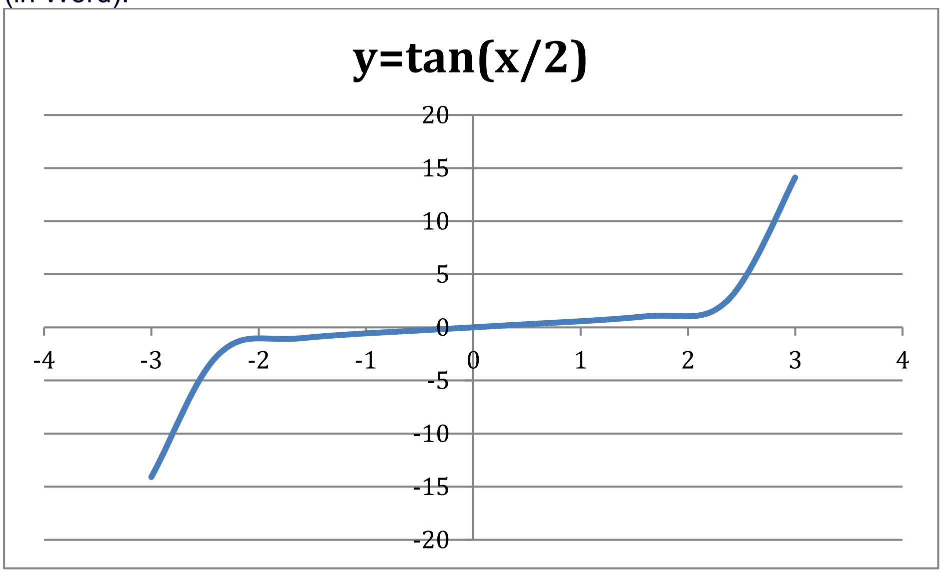

The amplitude of function $f(x) = \tan(x)$ equals ∞ so in our case amplitude of function $f(x) = \tan(\frac{x}{2})$ equals ∞.
Period of function $f(x) = \tan(x)$ equals π so in our case period of function $f(x) = tan(\frac{x}{2})$ equals $\frac{\pi}{\frac{1}{2}} = 2\pi$

4. Write the equation of the sine function with an amplitude of $\frac{1}{9}$ and a period of 3π.
As we know the amplitude A and period P of the function $f(x) = a\sin(kx)$ equals:
A=1* | a |= | a |
P=2π/k
So in our case a=1/9, $k = 2\pi/P = 2\pi/3\pi = 2/3$ and the equation of sine function is $f(x) = \frac{1}{9}\sin(\frac{2}{3}x)$

5. Write the equation of the cosine function with an amplitude of 2 and period of $\frac{3\pi}{5}$.
As we know the amplitude A and period P of the function $f(x) = a\cos(kx)$ equals:
A=1* | a |= | a |
P=2π/k
So in our case a=2, $k = \frac{2\pi}{P} = \frac{2\pi}{\frac{3\pi}{5}} = \frac{10}{3}$ and the equation of sine function is $f(x) = 2cos(\frac{10}{3}x)$