TRIGONOMETRIC FUNCTIONS

A DEFINITIONS

A.1 COMPLETING TABLES OF VALUES

Ex 1: For $f(x) = \sin(x)$, complete the table of values for the multiples of $\frac{\pi}{8}$ (rounded to 2 decimal places):

x	0	$\frac{\pi}{8}$	$\frac{\pi}{4}$	$\frac{3\pi}{8}$	$\frac{\pi}{2}$
$\sin(x)$	0	0.38	0.71	0.92	1

Answer: To calculate these values on your calculator, for each angle:

- If you are in degree mode, first convert the angle to degrees: for example, $\frac{\pi}{4} \times \frac{180^\circ}{\pi} = 45^\circ$, then $\sin(45^\circ) \approx 0.71$.
- If your calculator is set to radians, you can directly compute $\sin\left(\frac{\pi}{4}\right) \approx 0.71$.

x	0	$\frac{\pi}{8}$	$\frac{\pi}{4}$	$\frac{3\pi}{8}$	$\frac{\pi}{2}$
$\sin(x)$	0	0.38	0.71	0.92	1

Ex 2: Complete the table of values for the multiples of $\frac{\pi}{6}$ (rounded to 2 decimal places):

x	0	$\frac{\pi}{6}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{5\pi}{6}$
$\cos(x)$	1	0.87	0.5	0	-0.5	-0.87

Answer: To calculate these values on your calculator:

- If you are in degree mode, convert the angle to degrees: e.g., $\frac{\pi}{6} \times \frac{180^\circ}{\pi} = 30^\circ$, then $\cos(30^\circ) \approx 0.87$.
- If your calculator is in radian mode, you can directly compute $\cos\left(\frac{\pi}{6}\right) \approx 0.87$.

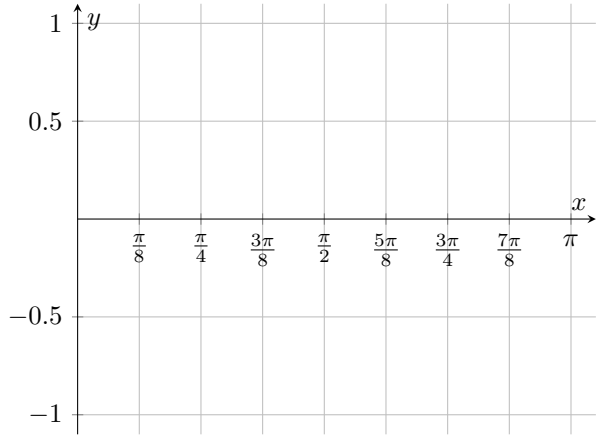
x	0	$\frac{\pi}{6}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{5\pi}{6}$
$\cos(x)$	1	0.87	0.5	0	-0.5	-0.87

A.2 PLOTTING GRAPH

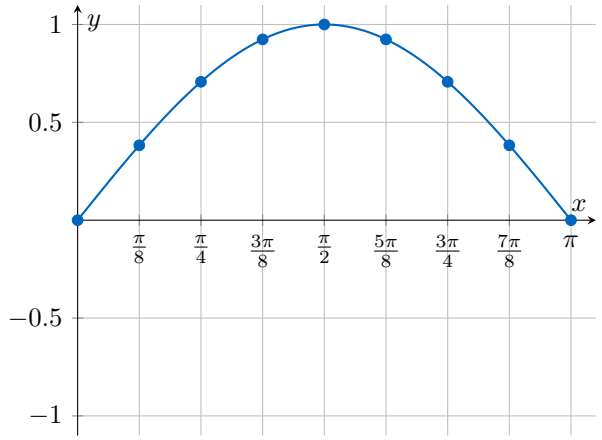
Ex 3: Here is a table of values for the function $f(x) = \sin(x)$:

x	0	$\frac{\pi}{8}$	$\frac{\pi}{4}$	$\frac{3\pi}{8}$	$\frac{\pi}{2}$	$\frac{5\pi}{8}$	$\frac{3\pi}{4}$	$\frac{7\pi}{8}$	π
$\sin(x)$	0	0.38	0.71	0.92	1.00	0.92	0.71	0.38	0

Plot the graph of the function.



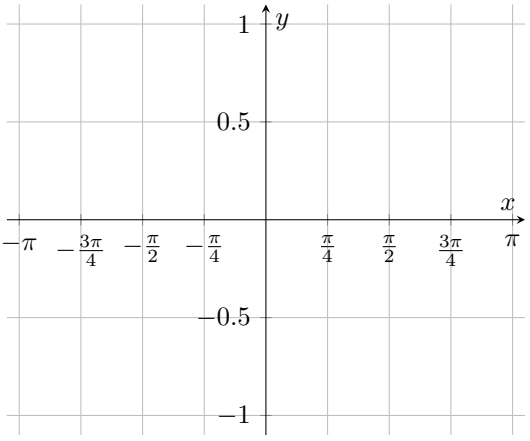
Answer:

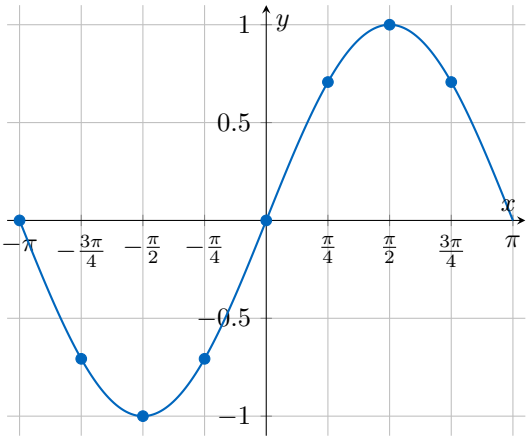


Ex 4: Here is a table of values for the function $f(x) = \sin(x)$:

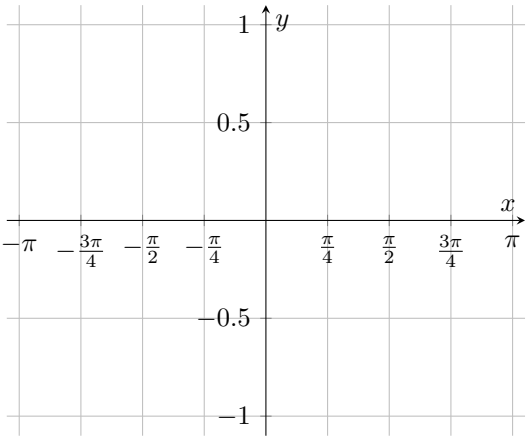
x	$-\pi$	$-\frac{3\pi}{4}$	$-\frac{\pi}{2}$	$-\frac{\pi}{4}$	0	$\frac{\pi}{4}$	$\frac{\pi}{2}$	$\frac{3\pi}{4}$
$\sin(x)$	0	-0.71	-1.00	-0.71	0	0.71	1	0.71

Plot the graph of the function on the interval $[-\pi\,;\,\pi]$:





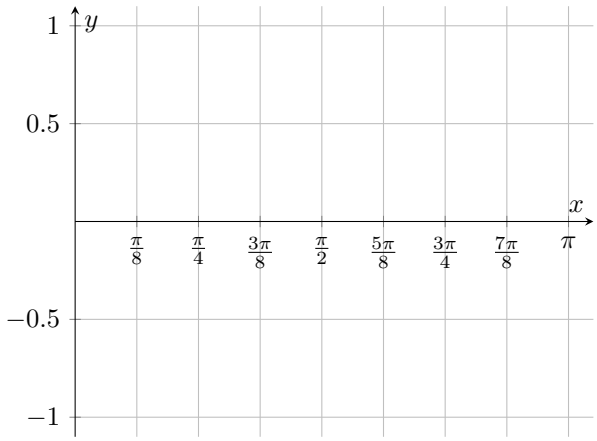
Answer:

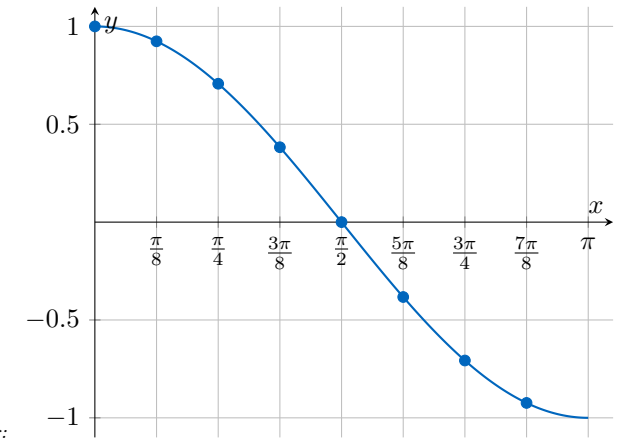


Ex 5: Here is a table of values for the function $f(x) = \cos(x)$:

x	0	$\frac{\pi}{8}$	$\frac{\pi}{4}$	$\frac{3\pi}{8}$	$\frac{\pi}{2}$	$\frac{5\pi}{8}$	$\frac{3\pi}{4}$	$\frac{7\pi}{8}$
$\cos(x)$	1	0.92	0.71	0.38	0	-0.38	-0.71	-0.92

Plot the graph of the function.



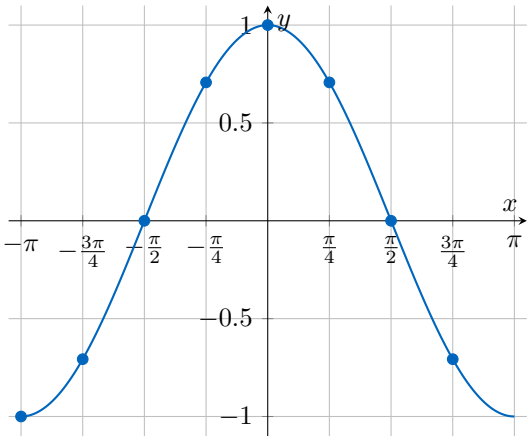


Answer:

Ex 6: Here is a table of values for the function $f(x) = \cos(x)$:

x	$-\pi$	$-\frac{3\pi}{4}$	$-\frac{\pi}{2}$	$-\frac{\pi}{4}$	0	$\frac{\pi}{4}$	$\frac{\pi}{2}$	$\frac{3\pi}{4}$
$\cos(x)$	-1	-0.71	0	0.71	1	0.71	0	-0.71

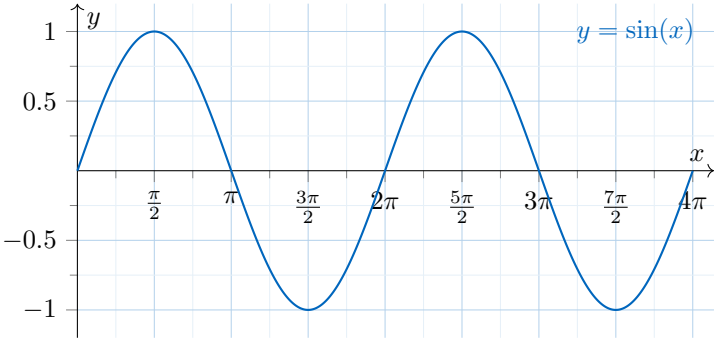
Plot the graph of the function on the interval $[-\pi\,;\,\pi]$:



Answer:

A.3 READING GRAPH

Ex 7: Below is the graph of the function $y = \sin(x)$, for $0 \leq x \leq 4\pi$.



1. Find the y-**intercept** of the graph.

   $\boxed{0}$

2. Use the graph to determine the values of x in the interval $0 \leq x \leq 4\pi$ such that $\sin(x) = 1$:

   $\boxed{\frac{\pi}{2}}, \boxed{\frac{5\pi}{2}}$

Answer:

1. The y-intercept of the graph is the point where $x = 0$:

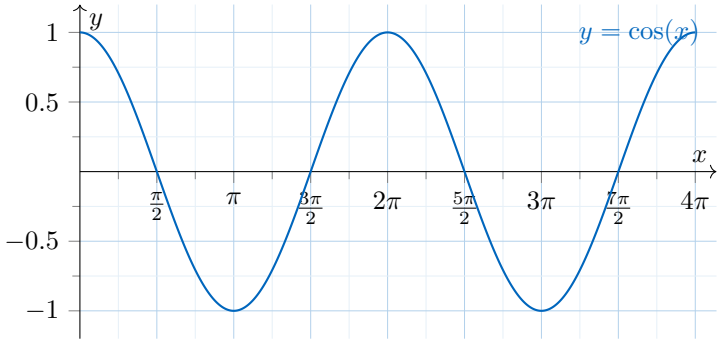
   $\boxed{0}$

2. We are asked to find all values of x in the interval $0 \leq x \leq 4\pi$ for which $\sin(x) = 1$.
   From the graph, $\sin(x) = 1$ when $x = \frac{\pi}{2}$ and again one

full period later, at $x = \dfrac{5\pi}{2}$. These are the only two values within the interval $[0, 4\pi]$.

$$\boxed{x = \frac{\pi}{2} \quad \text{and} \quad x = \frac{5\pi}{2}}$$

Ex 8: Below is the graph of the function $y = \cos(x)$, for $0 \leq x \leq 4\pi$.



1. Find the **y-intercept** of the graph.

$$\boxed{1}$$

2. Use the graph to determine the values of x in the interval $0 \leq x \leq 4\pi$ such that $\cos(x) = 0$:

$$\boxed{\frac{\pi}{2}}, \boxed{\frac{3\pi}{2}}, \boxed{\frac{5\pi}{2}}, \boxed{\frac{7\pi}{2}}$$

Answer:

1. The y-intercept is the value of the function when $x = 0$. We have:

$$\boxed{1}$$

2. We are asked to find all values of $x \in [0, 4\pi]$ such that $\cos(x) = 0$. From the graph, $\cos(x) = 0$ at:

$$\boxed{x = \frac{\pi}{2}, \frac{3\pi}{2}, \frac{5\pi}{2}, \frac{7\pi}{2}}$$