Topic: Horizontal and vertical shifts

Question: Which table shows values that satisfy the function?

$$f(x) = -\sin\left(x - \frac{\pi}{6}\right)$$

Answer choices:

A

x	4π/3	3π/2	5π/3	11π/6	2π
f(x)	-1	-√3/2	-1/2	0	1/2

B

x	4π/3	3π/2	5π/3	11π/6	2π
f(x)	-√3/2	-1	-√3/2	-1/2	1/2

C

x	4π/3	3π/2	5π/3	11π/6	2π
f(x)	1/2	√3/2	1	√3/2	1/2

D

x	4π/3	3π/2	5π/3	11π/6	2π
f(x)	1/2	0	-1/2	-√3/2	-1

Solution: C

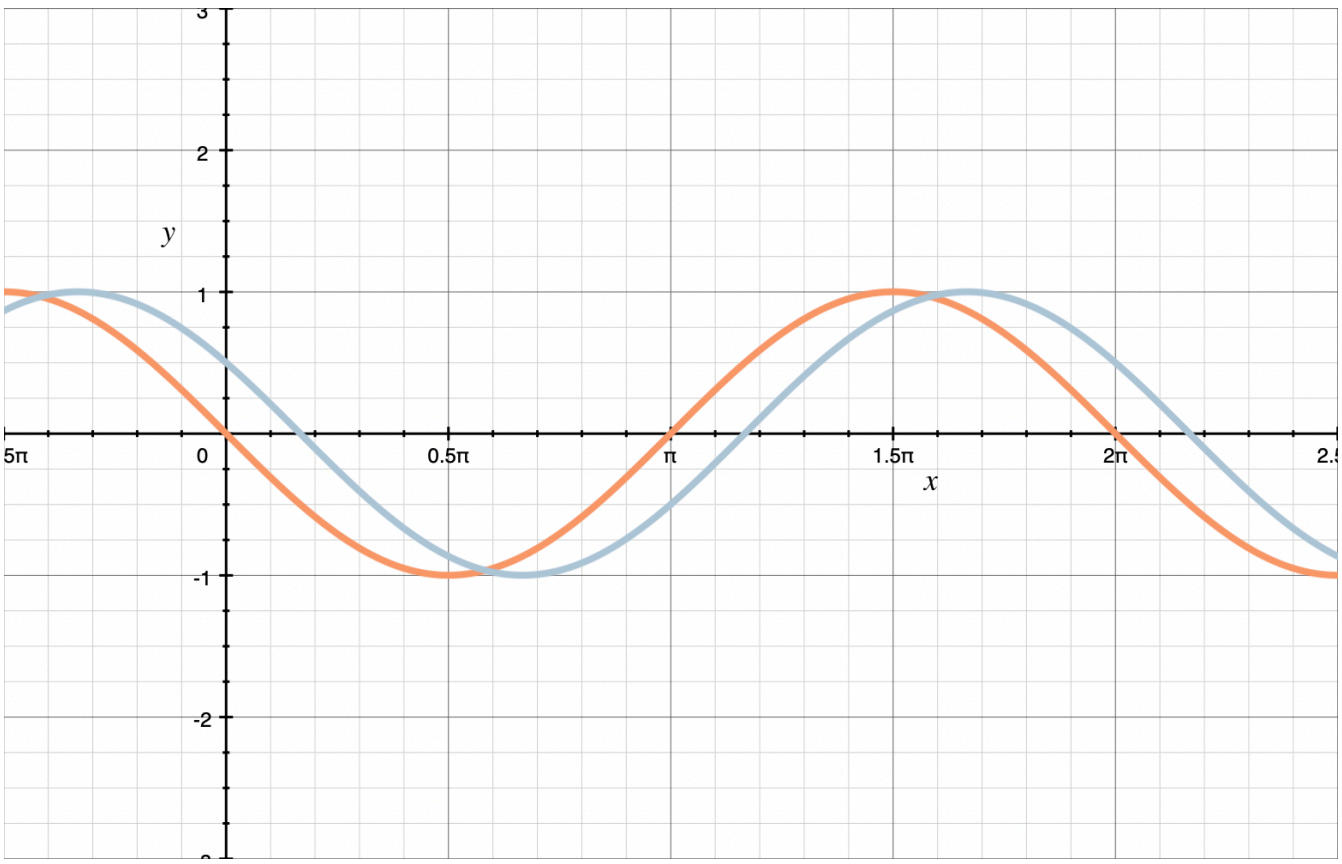
To start, ignore the negative sign in front of the sine function, and calculate values for $x - (\pi/6)$ and then $\sin(x - (\pi/6))$ at the indicated values of x.

x	4π/3	3π/2	5π/3	11π/6	2π
x-π/6	7π/6	4π/3	3π/2	5π/3	11π/6
sin(x-(π/6))	-1/2	-√3/2	-1	-√3/2	-1/2

Then to find the value of $f(x)$, we just need to multiply this last row by -1.

x	4π/3	3π/2	5π/3	11π/6	2π
f(x)	1/2	√3/2	1	√3/2	1/2

We can also visualize the $\pi/6$ shift to the right by graphing $y = -\sin x$ (in red) and the given function (in blue) on the same set of axes.

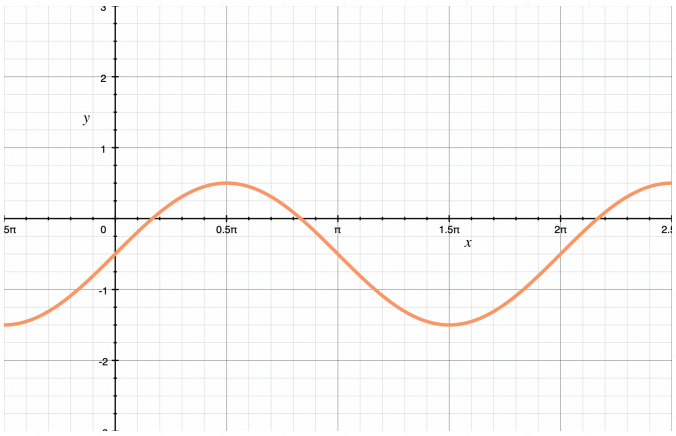


Topic: Horizontal and vertical shifts

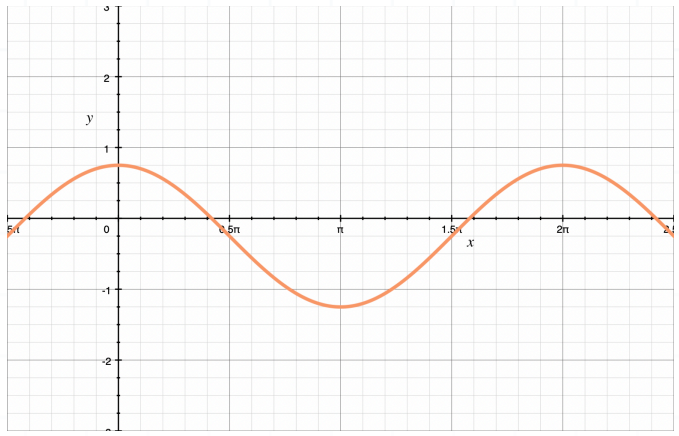
Question: Which curve is the graph of $y = \cos\theta - 0.25$?

Answer choices:

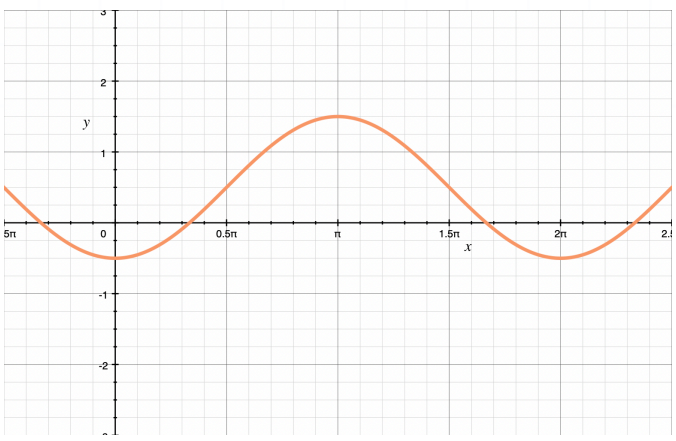
A



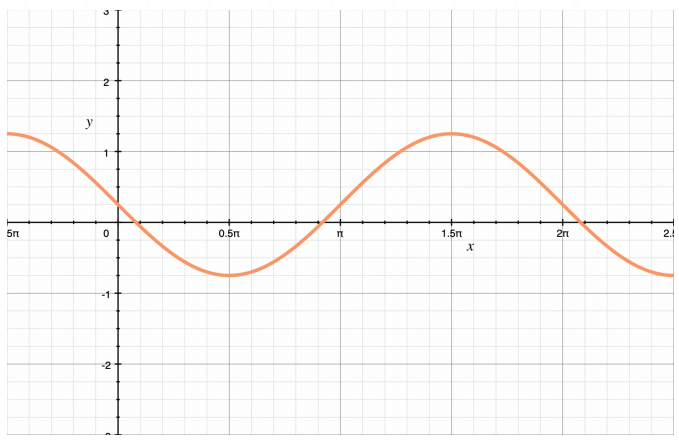
B



C



D



Solution: B

The function $y = \cos\theta - 0.25$ is the result of starting with the basic cosine function, $y = \cos\theta$ and shifting it down vertically by 0.25 units.

Therefore, we're looking for a cosine function that ranges from -1.25 to 0.75.

Topic: Horizontal and vertical shifts

Question: Consider the following statements.

I. The graph of $y = \sin(\theta - (\pi/2))$ on the interval $[0,2\pi)$ is identical to the graph of $y = \cos\theta$ on the same interval.

II. The graph of $y = \sin(\theta - (\pi/2))$ on the interval $[0,2\pi)$ is identical to the graph of $y = -\cos\theta$ on the same interval.

Answer choices:

A Statement I is true, and statement II is false.

B Statement I is false, and statement II is true.

C Statements I and II are both true.

D Statements I and II are both false.

Solution: B

Answer choice C can be eliminated, because it implies that the graphs of $y = \cos\theta$ and $y = -\cos\theta$ are identical, which they aren't.

Consider Statement II, and compare the values of $y = \sin(\theta - (\pi/2))$ and $y = -\cos\theta$ at key angles in the interval $[0,2\pi)$.

θ	0	$\frac{\pi}{2}$	π	$\frac{3\pi}{2}$
$\sin\left(\theta - \frac{\pi}{2}\right)$	-1	0	1	0
$-\cos\theta$	-1	0	1	0

It appears that Statement II is true, which means automatically that Statement I is false.