Trigonometry Chapter 4

Section 2

I. Vocabulary

Complete each statement:

1. Adding or subtracting a constant value OUTSIDE the PRIMARY FUNCTION corresponds to a _____ shift of the graph of the basic function. ADDING OUTSIDE corresponds to shifting _____; SUBTRACTING OUTSIDE corresponds to shifting _____.
2. Adding or subtracting a constant value INSIDE the PRIMARY FUNCTION corresponds to a _____ shift of the graph of the basic function. ADDING INSIDE corresponds to shifting _____; SUBTRACTING INSIDE corresponds to shifting _____.

III. Match each function with its one-period graph. Note that not all graphs will be used.

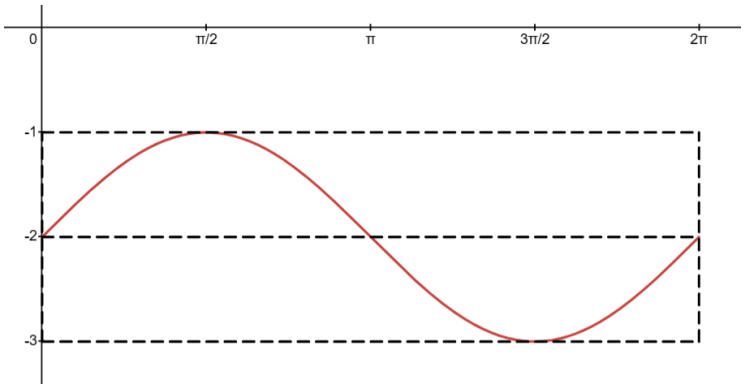
16. _____ $f(x) = -\sin(x+\pi)$

17. _____ $f(x) = \cos(x) + 2$

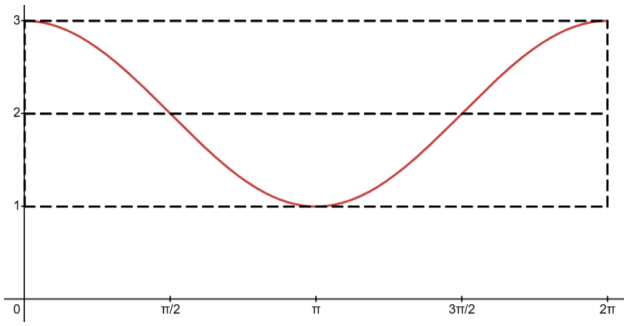
18. _____ $f(x) = \cos\left(x - \pi/2\right)$

19. _____ $f(x) = \sin(x) - 2$

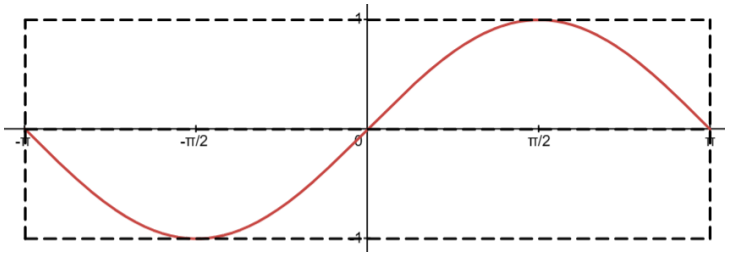
A.



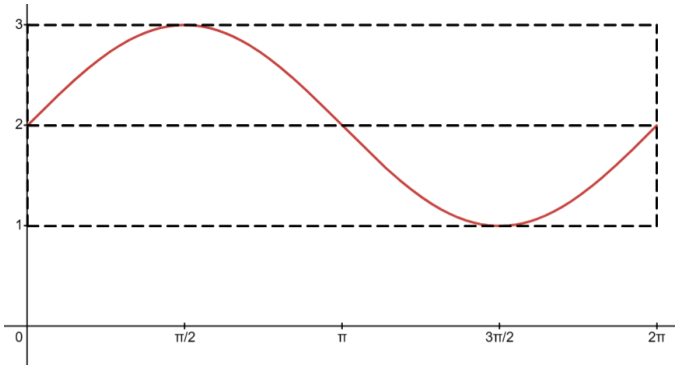
B.



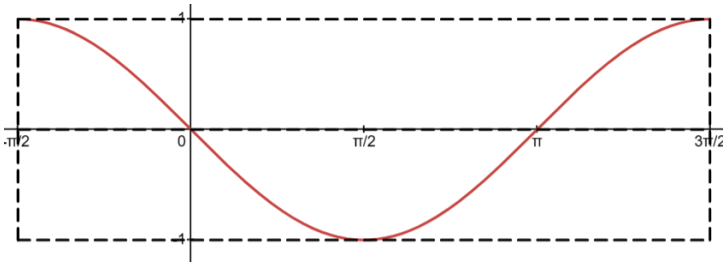
C.



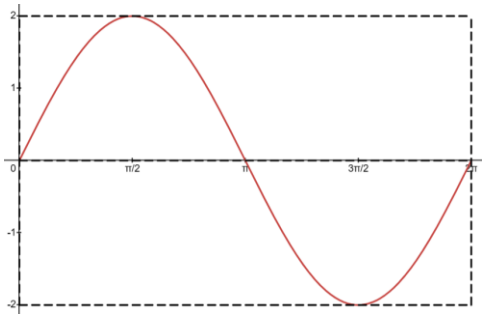
D.



E.



F.



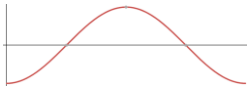
IIII. Graph the standard period of each function, as demonstrated in class.

Example:

a) $f(x) = -\cos\left(x - \pi/2\right)$ b) $f(x) = \sin(x+\pi) - 2$

Solution:

a) $f(x) = -\cos\left(x - \pi/2\right)$

Basic shape: 

Shift: $\rightarrow \pi/2$

Amplitude: $|-1| = 1$

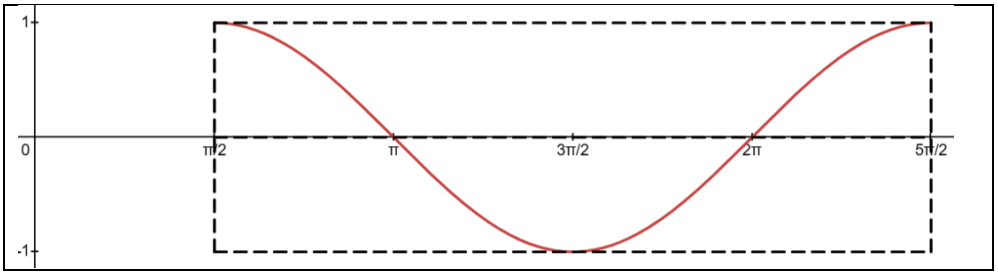
Standard Interval: $0 \le x - \pi/2 < 2\pi$

$\Rightarrow 0 + \pi/2 \le x - \pi/2 + \pi/2 < 2\pi + \pi/2$

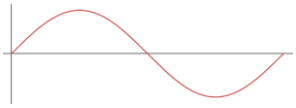
$\Rightarrow 0 + \pi/2 \le x - \pi/2 + \pi/2 < 4\pi/2 + \pi/2$

$\Rightarrow \pi/2 \le x < 5\pi/2$

So we have:



b) $f(x) = \sin(x+\pi) - 2$

Basic shape: 

Shift: $\leftarrow \pi, \quad \downarrow 2$

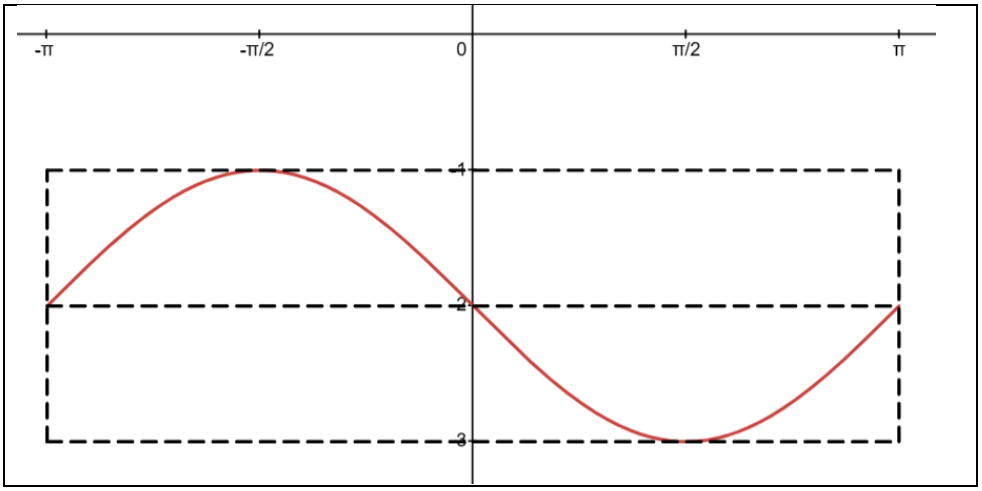
Amplitude: $|1| = 1$

Standard Interval: $0 \le x + \pi < 2\pi$

$\Rightarrow 0 - \pi \le x + \pi - \pi < 2\pi - \pi$

$\Rightarrow -\pi \le x < \pi$

So we have:



20. $f(x) = -\sin(x) - 2$

21. $f(x) = \sin\left(x - 3\pi/2\right)$

22. $f(x) = \cos\left(x + \pi/2\right) + 1$

23. $f(x) = \cos(x) - \frac{1}{2}$

24. $f(x) = \sin\left(x - \pi/2\right) + 3$

25. $f(x) = 2\sin(x) - 1$

26. $f(x) = -\frac{3}{4}\cos(x) + 2$

27. $f(x) = \cos(2x) - 1$

28. $f(x) = -\sin(4x) + 1$

V. For each function, determine the HORIZONTAL SHIFT of the basic shape function.

Example:

a) $f(x) = \cos\left(2x - \pi\right)$

b) $f(x) = \sin(4x + \pi) - 2$

Solution:

$$f(x) = \cos\left(2x - \pi\right)$$
$$= \cos\left(2x - 2\pi/2\right)$$
$$= \cos\left(2\left(x - \pi/2\right)\right)$$

So the horizontal shift is $\boxed{\rightarrow \ \pi/2}$

$$f(x) = \sin(4x + \pi) - 2$$
$$= \sin\left(4x + 4\pi/4\right) - 2$$
$$= \sin\left(4\left(x + \pi/4\right)\right) - 2$$

So the horizontal shift is $\boxed{\leftarrow \ \pi/4}$

26. $f(x) = -\cos(2x - \pi) - 3$

27. $f(x) = 3\sin\left(4x - \pi/2\right)$