

p. 304

(35)

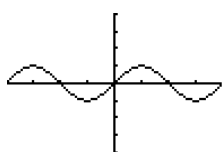
$$f(x) = \sin x$$

$$g(x) = \cos\left(x - \frac{\pi}{2}\right)$$

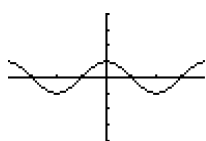
$$\sin x = \cos\left(x - \frac{\pi}{2}\right)$$

#### 4-5 Graphs of Sine and Cosine (continued)

$$y = \sin x$$



$$y = \cos x$$



$$y = a \sin (bx - c) + d$$

$|a|$  = amplitude

$\frac{2\pi}{b}$  = period

$c$  → horizontal shift

$d$  = vertical shift

$$y = a \cos (bx - c) + d$$

set  $(bx - c) = 0$  to find starting point

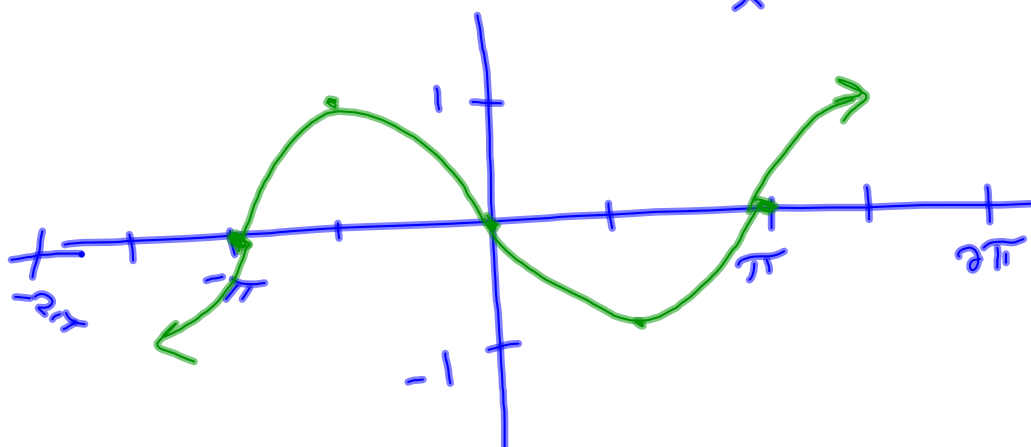
$(bx - c) = 2\pi$  to find ending point

Ex 1 Graph:

$$y = \sin(x + \pi)$$

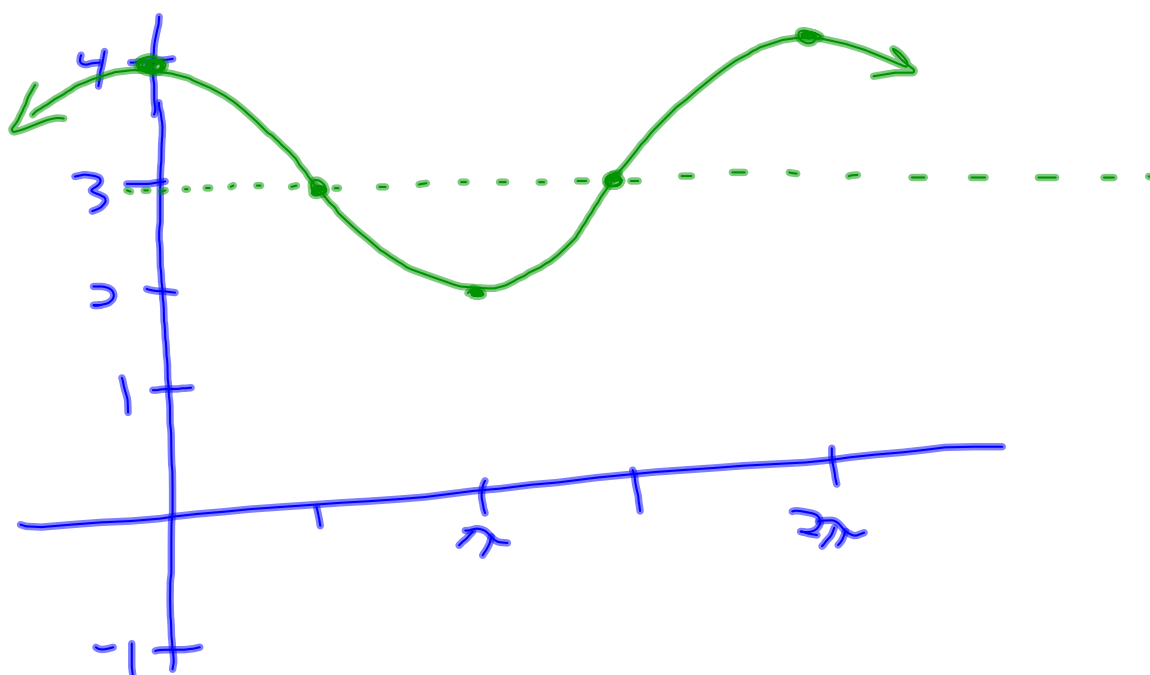
$$(x + \pi) = 0$$
$$x = -\pi$$

$$(x + \pi) = 2\pi$$
$$x = \pi$$



Ex 2 Graph:

$$y = \cos x + 3$$



Ex 3 Graph:

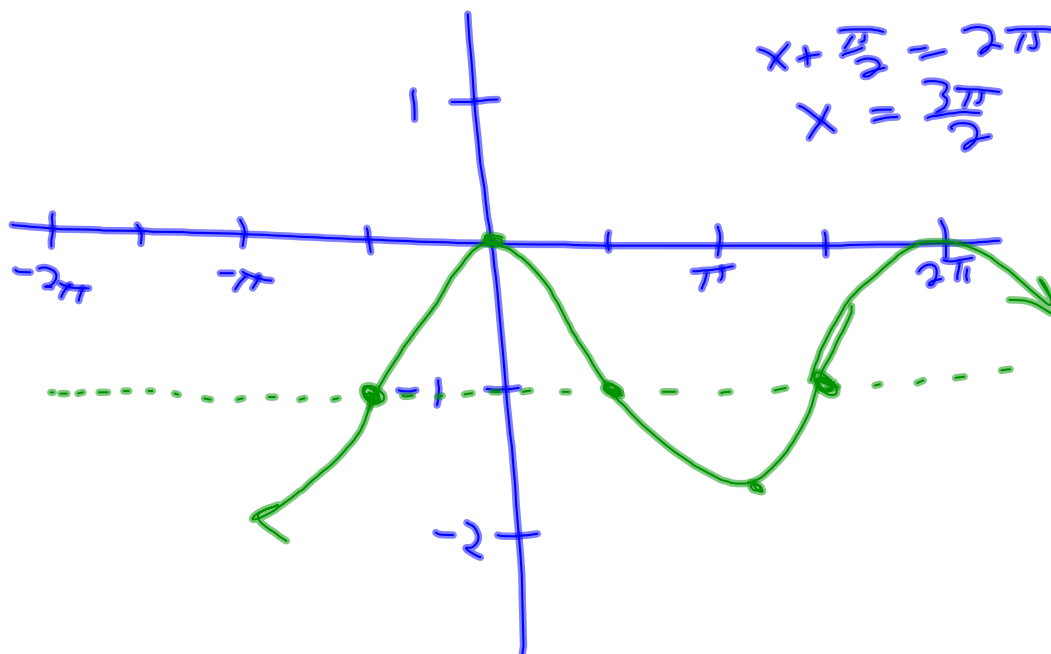
$$y = \sin\left(x + \frac{\pi}{2}\right) - 1$$

$$x + \frac{\pi}{2} = 0$$

$$x = -\frac{\pi}{2}$$

$$x + \frac{\pi}{2} = 2\pi$$

$$x = \frac{3\pi}{2}$$



Ex. 4

Graph:

$$y = 3\sin(2x + \pi) + 5$$

$$\text{Start: } 2x + \pi = 0$$

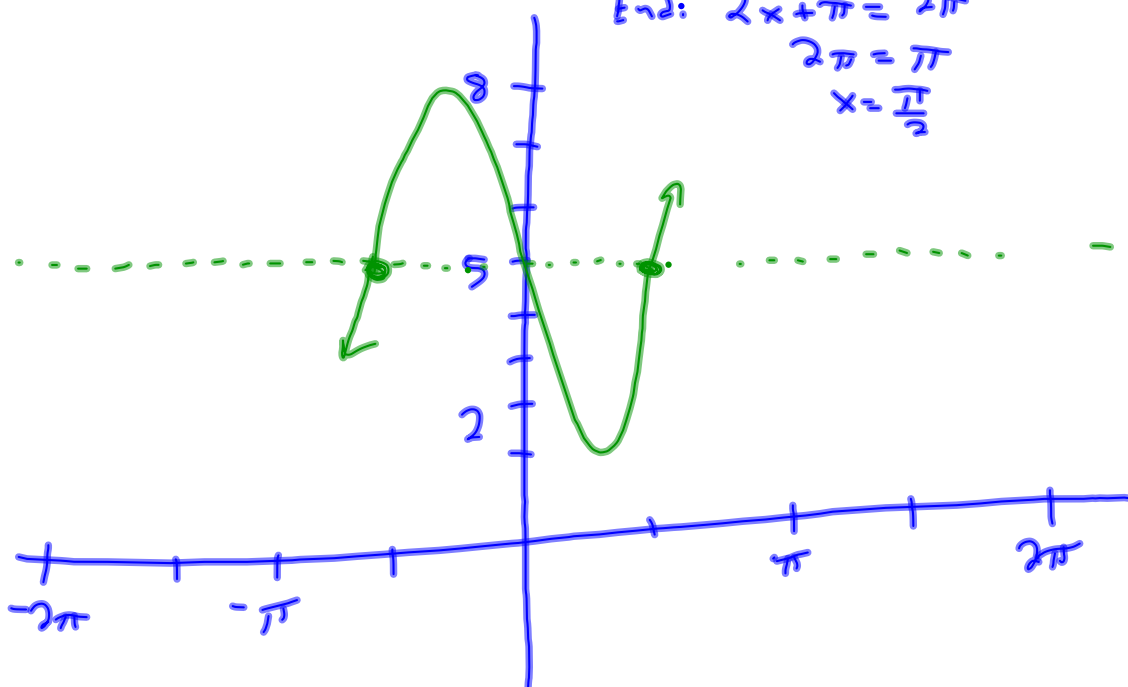
$$2x = -\pi$$

$$x = -\frac{\pi}{2}$$

$$\text{End: } 2x + \pi = 2\pi$$

$$2x = \pi$$

$$x = \frac{\pi}{2}$$



Homework  
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