5. 0/1 points

Solve the equation. (Find all solutions of the equation in the interval $[0, 2\pi)$.)

$2\sin(4x) = -4\sin(2x) \Rightarrow$

$\sin(2u) = 2\sin(u)\cos(u)$

$\Rightarrow 2[2\sin(2x)\cos(2x)] = -4\sin(2x)$

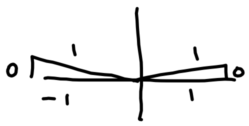
$\sin(2x)\cos(2x) = -\sin(2x)$

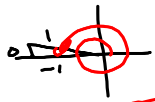
$\Rightarrow \sin(2x)\cos(2x) + \sin(2x) = 0$

$\Rightarrow \sin(2x)[\cos(2x) + 1] = 0$

$\Rightarrow \sin(2x) = 0$ or $\cos(2x) + 1 = 0$

$\cos(2x) = -1$





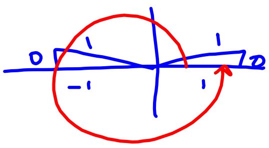
$2x = 0, \pi$, but that's not capturing all of the 2x's!

$2x = \pi, 3\pi$

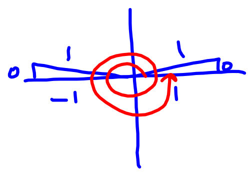
$x = \frac{\pi}{2}, \frac{3\pi}{2}$

Want $0 \le x < 2\pi$ (from $x \in [0, 2\pi)$)

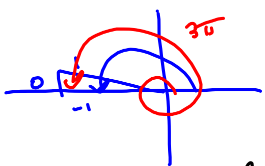
$\Rightarrow 0 \le 2x < 4\pi$!



$0 \le 2x = 2\pi < 4\pi$



$0 \le 2x = 4\pi$ is too big!



$2x = 3\pi$ also works

$3\pi < 4\pi$

$2x = 0, \pi, 2\pi, 3\pi$

$\boxed{x = 0, \frac{\pi}{2}, \pi, \frac{3\pi}{2}}$ $\Rightarrow$ Final answer, after seeing $\cos(2x) + 1 = 0$ adds no more solutions!

is correct!