Round 3

A) $A = 90 + 360n < 2016 \Rightarrow 450, 810, 1170, 1530, 1890$ - **5** values.

B) $\sin(4x) = \cos(2x) \Leftrightarrow 2\sin(2x)\cos(2x) - \cos(2x) = 0 \Leftrightarrow \cos(2x)(2\sin 2x - 1) = 0$

$\Rightarrow \cos(2x) = 0$ or $\sin(2x) = \dfrac{1}{2}$.

1st condition $\Rightarrow 2x = \dfrac{\pi}{2} + n\pi \Rightarrow x = \dfrac{\pi}{4} + \dfrac{n\pi}{2} = \dfrac{\pi(2n+1)}{4}$ and $n = -1, 0 \Rightarrow \underline{\pm\dfrac{\pi}{4}}$.

2nd condition $\Rightarrow 2x = \dfrac{\pi}{6} + 2n\pi \Rightarrow x = \dfrac{\pi}{12} + n\pi = \dfrac{\pi(12n+1)}{12}$ and $n = 0 \Rightarrow \underline{\dfrac{\pi}{12}}$.

$\qquad\qquad\qquad 2x = \dfrac{5\pi}{6} + 2n\pi \Rightarrow x = \dfrac{5\pi}{12} + n\pi = \dfrac{\pi(12n+5)}{12}$ and $n = 0 \Rightarrow \underline{\dfrac{5\pi}{12}}$.

C) $A\left(\dfrac{1}{2}, Cos^{-1}\left(\dfrac{1}{2}\right)\right) = \left(\dfrac{1}{2}, \dfrac{\pi}{3}\right)$, since $\cos\dfrac{\pi}{3} = \dfrac{1}{2}$.

$\overline{AD}$ has equation $y = \dfrac{\pi}{3}$. $\overline{BC}$ has slope $-\dfrac{\pi}{2}$ and

equation $y - 0 = -\dfrac{\pi}{2}(x - 1) \Leftrightarrow y = \dfrac{\pi}{2}(1 - x)$

$\dfrac{\pi}{3} = \dfrac{\pi}{2}(1 - x) \Rightarrow x = \dfrac{1}{3} \Rightarrow AD = \dfrac{1}{2} - \dfrac{1}{3} = \underline{\dfrac{1}{6}}$.