2.49

77

נניח $A=60^\circ$

כיוון ראשון: $\sin 180^\circ + \sin 3B + \sin 3C = 0 + 2\sin\frac{3B+3C}{2}\cos\frac{3B-3C}{2} = 2\sin 2\pi \cos\frac{3B-3C}{2} = 0$

$3B+3C = 3\cdot 120 = 2\pi$

כיוון שני $\sin 3A + \sin 3B + \sin 3C = 0$

$0 = \sin(3\pi - 3B - 3C) + \sin 3B + \sin 3C = \sin(3B+3C) + \sin 3B + \sin 3C =$

$0 = \sin(3B+3C) + 2\sin\frac{3B+3C}{2}\cos\frac{3B-3C}{2} = 2\sin\frac{3B+3C}{2}\cos\frac{3B+3C}{2} + 2\sin\frac{3B+3C}{2}\cos\frac{3B-3C}{2} =$

$0 = 2\sin\frac{3B+3C}{2}\left(\cos\frac{3B+3C}{2} + \cos\frac{3B-3C}{2}\right)$

$\frac{3B+3C}{2} = \pi k$

$3B+3C = 2\pi k$

$B+C = \frac{2}{3}\pi k$

עבור $k=1$ נקבל

$B+C = 120^\circ$

$\Rightarrow \boxed{A=60^\circ}$

$\frac{3B+3C}{2} = \pi - \frac{3B-3C}{2} + 2\pi k$

$3B = 2\pi k + \pi$

$B = \frac{2\pi}{3}k + \frac{\pi}{3}$

$B = 60^\circ$ עבור $k=0$

$\frac{3B+3C}{2} = -\pi + \frac{3B-3C}{2} + 2\pi k$

$3C = 2\pi k - \pi$

$C = \frac{2}{3}\pi k - \frac{\pi}{3}$

עבור $k=1$

$\boxed{C=60^\circ}$