Title: A functional bound for Young’s cosine polynomial II

Author(s): Jolie Zhi Yi Fong, Tuo Yeong Lee, Raghavendra Narayan Rao and Pei Xian Wong

We prove that

$$2 \sum_{k=1}^{\frac{n}{2}+1} \frac{(-1)^{k-1}}{k} + \sum_{k=1}^{n} \frac{\cos k\theta}{k} \geq \frac{1}{4} (1 + \cos \theta)^2 \quad (n = 1, 2, 3, \ldots; \theta \in (0, \pi)),$$

where equality holds if and only if $n = 2$ and $\theta = \pi - \cos^{-1} \frac{1}{3}$. This refines inequalities due to Alzer et al. and Fong et al.

Address:
Jolie Zhi Yi Fong
Department of Mathematics
and Statistics
NUS High School of Math and Science
20 Clementi Avenue 1
Singapore 129957
Republic of Singapore

Address:
Tuo Yeong Lee
Department of Mathematics
and Statistics
NUS High School of Math and Science
20 Clementi Avenue 1
Singapore 129957
Republic of Singapore

Address:
Raghavendra Narayan Rao
Department of Mathematics
and Statistics
NUS High School of Math and Science
20 Clementi Avenue 1
Singapore 129957
Republic of Singapore

Address:
Pei Xian Wong
Department of Mathematics
and Statistics
NUS High School of Math and Science
20 Clementi Avenue 1
Singapore 129957
Republic of Singapore