and so

$$\frac{1}{(k+1)^2}\,\Omega\left(\frac{k\pi}{n+1}\right) \geqq \frac{\pi}{n+1}\,\frac{k(k-1)}{(k+1)^2}\int_{\frac{(k-1)\pi}{n+1}}^{\frac{k\pi}{n+1}} \Omega(t)\frac{dt}{t^2} \geqq \frac{\pi}{5(n+1)}\int_{\frac{(k-1)\pi}{n+1}}^{\frac{k\pi}{n+1}} \Omega(t)\frac{dt}{t^2}.$$

Hence, for $n \geqq 2$,

$$A_n \geqq \frac{2M}{5\pi(n+1)}\sum_{k=2}^{n}\int_{\frac{(k-1)\pi}{n+1}}^{\frac{k\pi}{n+1}} \Omega(t)\frac{dt}{t^2} \geqq \frac{2M}{5\pi(n+1)}\int_{\frac{\pi}{n+1}}^{\frac{\pi}{2}} \Omega(t)\frac{dt}{t^2}.$$

Since Ω is non-decreasing, we have

$$\int_{\pi/n+1}^{\pi/2} \Omega(t)\frac{dt}{t^2} = \frac{1}{\pi}\int_{2}^{n+1} \Omega\left(\frac{\pi}{t}\right)dt \geqq \frac{1}{\pi}\sum_{k=2}^{n}\Omega\left(\frac{\pi}{k+1}\right).$$

Hence

$$A_n \geqq \frac{2M}{5\pi^2(n+1)}\sum_{k=2}^{n}\Omega\left(\frac{\pi}{k+1}\right) \tag{2.7}$$

and the left hand side inequality (1.11) follows from (2.5), (2.6) and (2.7).

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