1. If x and y are acute angles such that $\cos x + \cos y = \frac{3}{2}$ and $\sin x + \sin y = \frac{3}{4}$, then the value of $\sin(x+y)$ is

(1) $\frac{2}{5}$ (2) $\frac{3}{4}$

(3) $\frac{3}{5}$ (4) $\frac{4}{5}$

2. If $L = \sin^2\left(\frac{\pi}{16}\right) - \sin^2\left(\frac{\pi}{8}\right)$ and $M = \cos^2\left(\frac{\pi}{16}\right) - \sin^2\left(\frac{\pi}{8}\right)$

(1) $L = -\frac{1}{2\sqrt{2}} + \frac{1}{2}\cos\frac{\pi}{8}$ (2) $L = \frac{1}{4\sqrt{2}} - \frac{1}{4}\cos\frac{\pi}{8}$

(3) $M = \frac{1}{4\sqrt{2}} + \frac{1}{4}\cos\frac{\pi}{8}$ (4) $M = \frac{1}{2\sqrt{2}} + \frac{1}{2}\cos\frac{\pi}{8}$

3. $\left(1+\cos\frac{\pi}{8}\right)\left(1+\cos\frac{3\pi}{8}\right)\left(1+\cos\frac{5\pi}{8}\right)\left(1+\cos\frac{7\pi}{8}\right)$ is equal to

(1) $\frac{1}{2}$ (2) $\cos\frac{\pi}{8}$

(3) $\frac{1}{8}$ (4) $\frac{1+\sqrt{2}}{2\sqrt{2}}$

4. If $\sin\theta + \cos\theta = \frac{1}{2}$, then $16(\sin(2\theta) + \cos(4\theta) + \sin(6\theta))$ is equal to:

(1) 23 (2) -27

(3) -23 (4) 27

5. $\tan^6 20^\circ - 33\tan^4 20^\circ + 27\tan^2 20^\circ + 4 =$

6. For any angle θ, the expression $\frac{2\cos 8\theta + 1}{2\cos\theta + 1}$ is equal to

(1) $(2\cos\theta+1)(2\cos 2\theta+1)(2\cos 4\theta+1)$ (2) $(\cos\theta-1)(\cos 2\theta-1)(\cos 4\theta-1)$

(3) $(2\cos\theta-1)(2\cos 2\theta-1)(2\cos 4\theta-1)$ (4) $(2\cos\theta+1)(2\cos 2\theta-1)(2\cos 4\theta+1)$

7. The value of $\cos\frac{\pi}{7} + \cos\frac{2\pi}{7} + \cos\frac{3\pi}{7} + \cos\frac{4\pi}{7} + \cos\frac{5\pi}{7} + \cos\frac{6\pi}{7} + \cos\frac{7\pi}{7}$ is

(1) 1 (2) -1

(3) 0 (4) none of these.

8. If $16\cos\left(\frac{2\pi}{15}\right)\cos\left(\frac{4\pi}{15}\right)\cos\left(\frac{8\pi}{15}\right)\cos\left(\frac{16\pi}{15}\right) = n$, the value of n is

(1) 1 (2) 0

(3) 3 (4) 2

9. The value of $\cos\frac{4\pi}{5}\cos\frac{6\pi}{5}\cos\frac{8\pi}{5}$ is equal to

(1) $\frac{-1}{4\left(\sqrt{5}-1\right)}$ (2) $\frac{1}{4\left(\sqrt{5}-1\right)}$

(3) $\frac{\sec 72^\circ}{8}$ (4) $-\frac{1}{4\left(\sqrt{5}+1\right)}$

10. The arithmetic mean of the numbers $2\sin 2^\circ, 4\sin 4^\circ, 6\sin 6^\circ, \ldots\ldots 178\sin 178^\circ, 180\sin 180^\circ$ is

(1) $\sin 1^\circ$ (2) $\cot 1^\circ$

(3) $\tan 1^\circ$ (4) $\cos 1^\circ$