1. If θ lies in the second quadrant and $3\tan\theta+4=0$, then the value of $2\cot\theta-5\cos\theta+\sin\theta$ is $\frac{6}{k}$ then find k.

2. If $\cos(\alpha+\beta)=\frac{3}{5}$, $\sin(\alpha-\beta)=\frac{5}{13}$ and $0<\alpha,\beta<\frac{\pi}{4}$, then $\tan(2\alpha)$ is equal to:
(1) $\frac{21}{16}$
(2) $\frac{63}{52}$
(3) $\frac{33}{52}$
(4) $\frac{63}{16}$

3. $\lambda=\sin^2(5^o)+\sin^2(10^o)+\ldots\ldots+\sin^2(85^o)$. Then number of positive divisors of $2\lambda-8$ is equal to
(1) 2
(2) 3
(3) 4
(4) 5

4. For any $\theta\in\left(\frac{\pi}{4},\frac{\pi}{2}\right)$, the expression $3(\sin\theta-\cos\theta)^4+6(\sin\theta+\cos\theta)^2+4\sin^6\theta$ equals:
(1) $13-4\cos^2\theta+6\cos^4\theta$
(2) $13-4\cos^6\theta$
(3) $13-4\cos^2\theta+6\sin^2\theta\cos^2\theta$
(4) $13-4\cos^4\theta+2\sin^4\theta\cos^2\theta$

5. The value of $\frac{\sin 22^\circ\cos 8^\circ+\cos 158^\circ\cos 98^\circ}{\sin 23^\circ\cos 7^\circ+\cos 157^\circ\cos 97^\circ}=$
(1) 1
(2) 2
(3) 1/2
(4) 1/4

6. If $F(k)=\left(1+\sin\frac{\pi}{2k}\right)\left(1+\sin(k-1)\frac{\pi}{2k}\right)\left(1+\sin(2k+1)\frac{\pi}{2k}\right)\left(1+\sin(3k-1)\frac{\pi}{2k}\right)$, then the value of $F(1)+F(2)+F(3)$ is equal to
(1) $\frac{3}{16}$
(2) $\frac{1}{4}$
(3) $\frac{5}{16}$
(4) $\frac{7}{16}$

7. Let the maximum and minimum value of the expression $2\cos^2\theta+\cos\theta+1$ is M and m respectively, then the value of $\left[\frac{M}{m}\right]$ is, (where $[.]$ is the greatest integer function)

8. The maximum value of $3\cos\theta+5\sin\left(\theta-\frac{\pi}{6}\right)$ for any real value of θ is :
(1) $\sqrt{19}$
(2) $\sqrt{31}$
(3) $\frac{\sqrt{79}}{2}$
(4) $\sqrt{34}$

9. The number of integers in the range of $3\sin^2 x+3\sin x\ \cos x+7\cos^2 x$ are:
(1) 3
(2) 4
(3) 5
(4) 6

10. Let $\alpha=\max\limits_{x\in\mathbf{R}}\left\{8^{2\sin 3x}\cdot 4^{4\cos 3x}\right\}$ and $\beta=\min\limits_{x\in\mathbf{R}}\left\{8^{2\sin 3x}\cdot 4^{4\cos 3x}\right\}$. If $8x^2+bx+c=0$ is a quadratic equation whose roots are $\alpha^{1/5}$ and $\beta^{1/5}$, then the value of c − b is equal to :
(1) 42
(2) 47
(3) 43
(4) 50