I- Answer the following questions:

1- Given $\tan\alpha = -2$ and $\frac{\pi}{2} < \alpha < \pi$. Calculate $\cos\alpha$ & $\sin\alpha$ then deduce the value of $E = \cos(\frac{5\pi}{2} + \alpha) \times \sin(\frac{-7\pi}{2} + \alpha)$.

2- Given $\tan x = \frac{3}{4}$, where $\pi < x < \frac{3\pi}{2}$. Calculate $\cot x, \cos x \& \sin x$, then deduce the value of $M = \cot(5\pi - x) - 3\sin(\frac{3\pi}{2} - x) + 2\cos(-\frac{\pi}{2} + x)$.

3- Given $\cos\alpha = -\frac{3}{5}$ and $\alpha \in]\pi, \frac{3\pi}{2}[$. Calculate $\cos^2\alpha + 3\sin\alpha - 2\cot\alpha$.

4- Given $\sin x = -\frac{4}{5}$ and $-\frac{\pi}{2} < x < \frac{\pi}{2}$. Calculate $5\cos^2 x + \cos(3\pi + x) + 4\tan x$.

5- Given $5\sin^2\alpha + \cos^2\alpha = 2$ and $0 < \alpha < \frac{\pi}{2}$. Calculate $E = \sin\alpha + \cos\alpha - 3\cot\alpha$.

6- Given $\sin\frac{\pi}{8} = \frac{\sqrt{2-\sqrt{2}}}{2}$

a. Calculate $\cos\frac{\pi}{8}$ *and* $\tan\frac{\pi}{8}$.

b. Deduce the values of $\cos\frac{7\pi}{8}, \sin\frac{5\pi}{8}$ *and* $\tan\frac{3\pi}{8}$.

II- 1) $x, y, z \& t$ are the angles of a parallelogram *ABCD*.

Show that: $\sin^2 x + \sin^2 y + \sin^2 z + \sin^2 t + \sin^2(x + y + z + t) = \frac{4}{1 + \cot^2 x}$.

2) Let $a \& b$ be two arcs such that: $a - b = \frac{\pi}{2}$ and $\frac{\sin a}{\sin b} = \frac{1}{2}$, where $0 < a < \pi$.

Calculate $\sin a, \cos a, \& \tan a$.