1. **SPHERICAL COORDINATES, III**

   Consider the sphere of radius r, in spherical coordinates (θ, ϕ), with line element

   $$ds^2 = r^2 \left(d\theta^2 + \sin^2 \theta \, d\phi^2 \right)$$

   (a) Find the connection 1-forms $\omega^i{}_j$ in this basis.

   (b) Compute $\Omega^i{}_j = d\omega^i{}_j + \omega^i{}_k \wedge \omega^k{}_j$ for $i, j = 1, 2$ (and where there is an implicit sum over k).

   (c) **(Optional for MTH 434/Required for MTH 534)**
   Compare your answers (and your computations) with those from the previous homework assignment.