Theorem. Given points P and Q, the set of points equidistant from P and Q is a line, which is the perpendicular bisector of $\overline{PQ}$.

We proved this in class for the Euclidean plane (see Theorem 3.5 in the textbook).

Your assignment is to prove it for spherical geometry using vectors, as follows:

(a) Let P and Q be points in $\mathbf{R}^3$, which are both distance 1 from the origin O. Show that the set of points in $\mathbf{R}^3$ equidistant from P and Q is a plane which passes through O.

Hint: Let X be any point in $\mathbf{R}^3$ equidistant from P and Q. Prove that $\overline{PQ} \perp \overline{OX}$. (This step is similar to #1 from the vector HW, except it's for vectors in $\mathbf{R}^3$.) Now, determine the plane in (a) using its vector form.

(b) Let P and Q be points on S^2. Deduce from (a) that the set of points in S^2 equidistant from P and Q is a line (great circle) on S^2. Explain why it's the perpendicular bisector of $\overline{PQ}$.