3 Abstract Probability

Let S be a finite set of points in the plane such that no three of them are collinear. For each convex polygon P whose vertices are in S, let $a(P)$ be the number of vertices of P, and let $b(P)$ be the number of points of S which are outside P. A line segment, a point, and the empty set are considered as convex polygons with $2, 1, 0$ vertices respectively. Prove that for every real number x,

$$\sum_{P} x^{a(P)}(1-x)^{b(P)} = 1,$$

where the sum is taken over all convex polygons with vertices in S.