Math Lab: Exploring the Fundamental Theorem of Algebra

According to the Fundamental Theorem of Algebra, every polynomial will have the same number of complex zeros as its degree. (Complex zeros are either real or imaginary numbers.)

Use a graphing calculator to graph the function given by $f(x) = x^4 - 4x^2 + k$ for different values of k. Find values of k such that the zeros of f satisfy the specified characteristics. (Some parts do not have unique answers.)

   (a)   Four real zeros

   (b) Two real zeros, each of multiplicity 2

   (c) Two real zeros and two complex zeros

   (d) Four complex zeros

   (e) Will the answers to parts (a) through (d) change for the function g, where $g(x) = f(x - 2)$?
Explain.

   (f)   Will the answers to parts (a) through (d) change for the function g, where $g(x) = f(2x)$?
Explain.