Using a system of five masses and four springs, both linear and non-linear changes in stiffness were detected by examining the frequency and time response of the system. The replacement of an individual spring with one of a different stiffness value created a linear change, while nonlinearities were introduced through the use of collisions of bumpers and loosened springs. From the time history of the input force and the accelerations of each mass, the frequency response functions, natural frequencies, mode shapes, power spectra, and probability density functions were calculated. These results were used, in conjunction with a numerical model, to detect changes in the system. In general, the natural frequencies and mode shapes were the best identifiers for linear changes, while the power spectra and probability density functions best identified nonlinear changes.