1. Define the quasi-frequency of an underdamped mass-spring system.

2. True or false:

a. For an underdamped system, the lengths of the time intervals between consecutive crossings of the equilibrium point by the mass continually decrease.

b. For an underdamped system, the lengths of the time intervals between consecutive points of maximum displacement of the the mass continually decrease.

3. Define the resonance frequency of a mass-spring system.

4. Which of the following are correct? There may be more than one answer.

a. The resonance frequency of an underdamped mass-spring system is less than the quasi-frequency.

b. As the damping constant of a mass-spring system approaches zero, the resonance frequency approaches the natural frequency of the undamped system.

c. As the damping constant of a mass-spring system approaches zero, the amplitude of the long-term oscillations grows without bound when a sinusoidal external force at the resonance frequency is applied to the sytem.

d. If a constant external stretching force is applied to an underdamped mass-spring system, the mass will oscillate about some equilibirium point.

4. A mass hangs vertically from a spring attached to the ceiling. The mass is then stretched beyond the equilibrium point and released. Show that the angular frequency of the resulting oscillations is $\sqrt{g/l}$, where l is the distance beyond its natural length that the spring is stretched when the mass is at equilibrium. How does this angular frequency compare with the angular frequency of the same mass-spring system placed horizontally on a frictionless surface?

5. A sinusoidal external force with a constant amplitude is applied to an underdamped mass spring system. Find the angular frequency of the external force that maximizes the (long-term) speed of the mass as it passes through the equilibrium point.