EXAMPLE 3-1 A weight of 9 lb is supported by a spring having a constant of 2 lb/in. and a dashpot having a damping constant of 1.3 lb sec/in. The mass has an initial displacement of 4 in. and an initial velocity of zero. Express the relation that governs the motion of the mass.

EXAMPLE 3-2 A mass of 20 kg is supported by an elastic member having a modulus of 320 N/m, and the system is critically damped. For initial conditions of zero displacement and velocity of 3 m/s, determine the maximum displacement and the displacement at $t = 0.5$, 1, and 2 sec.

EXAMPLE 3-3 A mass of 3.174 kg is supported by a spring having a modulus of 700 N/m and a dashpot having a damping constant of 14.18 N · s/m. Write the equation that governs the motion of the mass.

EXAMPLE 2-5 An aluminum-alloy bar, 0.5 in. square, 100 in. long, and hanging vertically, suspends a weight of 5 lb at the lower end. The bar weighs 2.5 lb, and the material has a tension-compression modulus of elasticity of 10^7 psi. Obtain the natural frequency of oscillation for the arrangement (a) neglecting the weight of the bar, and (b) based on the approximation developed in Section 2-11.

† See Section 10-8.