Exercise 5

For the spring in Exercise 3, find the mass that would produce critical damping.

Solution

Critical damping occurs when

$$c^2 - 4mk = 0.$$

Solve for m.

$$m = \frac{c^2}{4k}$$

In Exercise 3 the spring constant is $k = 12$ N/m, and the damping constant is $c = 14$ N · s/m.

$$m = \frac{14^2}{4(12)} = \frac{49}{12} \text{ kg} \approx 4.08 \text{ kg}$$