Comment. This problem is rather long to state, so I refer you to the book. The main point here seems to be conversion of units: I will stick with feet and seconds. Then you are told that the mass m satisfies $mg = 3$ or $m = 3/32$, since g, the acceleration of gravity, is 32 ft/sec^2. You also have $(k)(1/4) = 3$ for the spring constant k. So $k = 12$. Once you have these coefficients, the problem just asks for the solution to

$$\frac{3}{32}u'' + 12u = 0, \text{ with } y(0) = -1/12, \ y'(0) = 2.$$

The signs on $y(0)$ and $y'(0)$ may look wrong but B& DiP are using the convention that u increases as you go downward. Since the equation simplifies to

$$u'' + (2)(8)^2 y = 0,$$

the rest of this is just solving this equation with the given initial conditions, and calculating ω, T, R and δ from the representation $u(t) = R\cos(\omega t - \delta)$ for the solution.