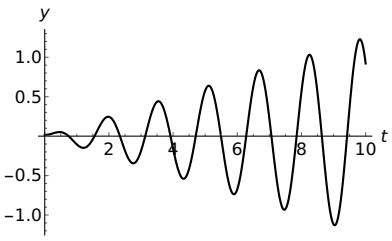
3. [14 points] In this problem we consider the differential equation $y'' + ky' + 16y = F_0 \cos(\omega t)$.

a. [7 points] If the solution to the problem is shown in the figure to the right when $F_0 = 1$, what can you say about the values of k and ω? Solve your equation and explain how your solution would give this graph.



b. [7 points] Now suppose that when $F_0 = 0$ the phase portrait for the equation is shown to the right. Which of $k = -4$, $k = 6$, or $k = 10$ could we have used in this case? Solve the problem with that value of k and explain how your solution would give this graph.