18.034, Honors Differential Equations
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3/8/04

I talked with one student, and I believe the methodical approach of the last 2 lectures has helped students catch-up. Unfortunately it has left us behind schedule. We've already done most of §3.7, but there is a bit more to go. And inhomog. systems of the form $p(D)[y] = e^{at}\cos\beta t \bullet h(t)$, h a poly., will be easy with our setup. But we probably won't get to §3.8. And §4.1, §4.3 might need to be done in Wed. rec.

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1. Examples of homog. const. coeff. linear systems w/ complex roots/ eigenvalues, no repeated roots.

   $$(D^2+\omega^2)y = 0 \rightsquigarrow y = C_1\cos(\omega t) + C_2\sin(\omega t) = A\cos(\omega t).$$

   $$(D^3-1)y = 0 \rightsquigarrow y = C_1e^t + C_2e^{-\frac{1}{2}t}\cos\left(\frac{\sqrt{3}}{2}t\right) + C_3e^{-\frac{1}{2}t}\sin\left(\frac{\sqrt{3}}{2}t\right)$$

   $(D^n-1)y = 0$?

2. Repeated roots

   $$(D^4+2\omega^2D^2+\omega^4)y = 0 \rightsquigarrow y = C_1\cos(\omega t) + C_2\sin(\omega t) + C_3t\cos(\omega t) + C_4t\sin(\omega t).$$

3. Solving IVP's. $\begin{cases}(D^2+\omega^2)y = 0\\ y(t_0) = y_0\\ y(t_0) = v_0\end{cases}$

   What is the amplitude A of $y(t) = A\cos(\omega t - \Phi)$?
   What is $\tan(\Phi)$?

4. Phase $p \propto traits$ for overdamped, underdamped, crit. damped SHO? (probably not crash time)