MATH 54 – HINTS TO HOMEWORK 20

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Here are a couple of hints to Homework 20. Enjoy!

Section 4.4: The method of undetermined coefficients

4.4.3. Yes. $\frac{\sin(x)}{e^{4x}} = e^{-4x}\sin(x)$.

4.4.5. Yes. $4x\sin^2(x) + 4x\cos^2(x) = 4x$.

4.4.7. No. The method of undetermined coefficients only works for **constant-coefficient** linear differential equations, which is not the case because the coefficient of y'' is t.

4.4.13. Guess $y_p(t) = A\cos(3t) + B\sin(3t)$

4.4.21. Guess $y_p(t) = (At + B)t^2 e^{2t}$

(Always treat the polynomial term separately! You have to guess t^2e^{2t} because the general solution to the homogeneous equation is already $Ae^{2t} + Bte^{2t}$)

4.4.27. Guess:

$$y_p(t) = (At^3 + Bt^2 + Ct + D)t\cos(3t) + (Et^3 + Ft^2 + Gt + H)t\sin(3t)$$

(Always treat the polynomial term separately! You have to guess $t\cos(3t)$ and $t\sin(3t)$ because the general solution to the homogeneous equation is already $A\cos(3t) + B\sin(3t)$)

4.4.31. Guess:

$$y_p(t) = (At^3 + Bt^2 + Ct + D)te^{-t}\cos(t) + (Et^3 + Ft^2 + Gt + H)te^{-t}\sin(t)$$

(same remark as 27)

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Section 4.5: The superposition principle

4.5.1(b). By linearity, the solution is $y(t) = 2y_2(t) - 3y_1(t)$

4.5.3, 4.5.5. Use the fact that $y = y_p + y_0$, where y_0 is the general solution of the homogeneous equation.

4.5.9. Yes, because $(e^t + t)^2 = e^{2t} + 2te^t + t^2$

4.5.33. For the $\cos^3(t)$-term, use the fact that:

$$\cos^3(x) = \frac{1}{4}\cos(3x) + \frac{3}{4}\cos(x)$$

(ridiculous, I know...)