AMATH 351- Summer Quarter 2004

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Handout on the method of undetermined coefficients

$$ay'' + by' + cy = g(t) \quad (1)$$

$$ay'' + by' + cy = 0 \quad (2)$$

RHS: $g(t)$	Particular solution Y(t) of (1)
1. $b_k t^k + \cdots + b_1 t + b_0$	(i) $a_k t^k + \cdots + a_1 t + a_0$ (when 0 is not a root of the characteristic polynomial of (2)) (ii) $t^n(a_k t^k + \cdots + a_1 t + a_0)$ (when 0 is an n-times repeated root of the characteristic polynomial of (2))
2. $(b_k t^k + \cdots + b_1 t + b_0)e^{\alpha t}$	(i) $(a_k t^k + \cdots + a_1 t + a_0)e^{\alpha t}$ (when α is not a root of the characteristic polynomial of (2)) (ii) $t^n(a_k t^k + \cdots + a_1 t + a_0)e^{\alpha t}$ (when α is an n-times repeated root of the characteristic polynomial of (2))
3. $(b_k t^k + \cdots + b_1 t + b_0)e^{\alpha t}\cos\gamma t$ or $(b_k t^k + \cdots + b_1 t + b_0)e^{\alpha t}\sin\gamma t$	(i) $[(a_k t^k + \cdots + a_1 t + a_0)\cos\gamma t +$ $+(c_k t^k + \cdots + c_1 t + c_0)\sin\gamma t]e^{\alpha t}$ (when $\alpha + i\gamma$ is not a root of the characteristic polynomial of (2)) (ii) $t^n[(a_k t^k + \cdots + a_1 t + a_0)\cos\gamma t +$ $+(c_k t^k + \cdots + c_1 t + c_0)\sin\gamma t]e^{\alpha t}$ (when $\alpha + i\gamma$ is an n-times repeated root of the characteristic polynomial of (2))