Section 31.9: cont'd:

Tuesday, April 23, 2013
11:35 AM

example: Solve:

$$y'' - 5y' + 4y = 12e^x$$

complementary solution:

$$m^2 - 5m + 4 = 0$$
$$(m-4)(m-1) = 0$$
$$m = 4, 1$$

$$y_c = c_1 e^x + c_2 e^{4x}$$

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particular solution:

$$\cancel{y_p = Ae^x}$$ ← bad case because Ae^x is a like term to one of the terms in y_c

$$y_p = Axe^x$$ ← so we fixed this by multiplying by x until no like terms

take derivatives, plug into DE:

$$y_p = Axe^x$$
$$y_p' = Axe^x + Ae^x$$
$$y_p'' = Axe^x + Ae^x + Ae^x$$
$$= Axe^x + 2Ae^x$$

original DE:

original DE:

$$y'' - 5y' + 4y = 12e^x$$

$$\cancel{Axe^x} + 2Ae^x - 5\cancel{Axe^x} - 5Ae^x + 4\cancel{Axe^x} = 12e^x$$

$$-3Ae^x = 12e^x$$

$$-3A = 12$$

$$A = -4$$

$$y_p = -4xe^x$$

full solution:

$$y = y_c + y_p$$

$$= c_1 e^x + c_2 e^{4x} - 4xe^x$$

→ general solution