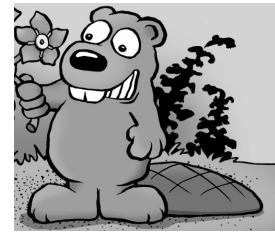# NON-HOMOGENEOUS EQUATIONS (§4.4): FIND y_c AND THE FORM OF y_p

Team effort! For each differential equation, find the complementary function $y_c(x)$, the general solution of the associated homogeneous equation. Then write down the correct form for $y_p(x)$, the particular solution. You do not need to find the unknown constants in $y_p(x)$, but you must identify the correct form, whether in case I (*no duplication of terms in* $y_c(x)$) or in case II (*with duplication*). Feel free to use the table at the bottom of the page.

1. $y'' + 9y = x + 2$

2. $y'' - 3y' - 4y = 17e^{4x}$

3. $y'' + 2y' + y = \sin 3x + 2\cos x$

4. $y'' - 7y' = x^2 + 4x + 7$

TABLE 4.4.1   Trial Particular Solutions

$g(x)$	Form of y_p
1. 1 (any constant)	A
2. $5x + 7$	$Ax + B$
3. $3x^2 - 2$	$Ax^2 + Bx + C$
4. $x^3 - x + 1$	$Ax^3 + Bx^2 + Cx + E$
5. $\sin 4x$	$A\cos 4x + B\sin 4x$
6. $\cos 4x$	$A\cos 4x + B\sin 4x$
7. e^{5x}	Ae^{5x}
8. $(9x - 2)e^{5x}$	$(Ax + B)e^{5x}$
9. $x^2 e^{5x}$	$(Ax^2 + Bx + C)e^{5x}$
10. $e^{3x}\sin 4x$	$Ae^{3x}\cos 4x + Be^{3x}\sin 4x$
11. $5x^2\sin 4x$	$(Ax^2 + Bx + C)\cos 4x + (Ex^2 + Fx + G)\sin 4x$
12. $xe^{3x}\cos 4x$	$(Ax + B)e^{3x}\cos 4x + (Cx + E)e^{3x}\sin 4x$

NON-HOMOGENEOUS EQUATIONS (§4.4): FIND y_c AND THE FORM OF y_p

Team effort! For each differential equation, find the complementary function $y_c(x)$, the general solution of the associated homogeneous equation. Then write down the correct form for $y_p(x)$, the particular solution. You do not need to find the unknown constants in $y_p(x)$, but you must identify the correct form, whether in case I (*no duplication of terms in $y_c(x)$*) or in case II (*with duplication*). Feel free to use the table at the bottom of the page.

1. $y'' + 4y = 3x + 3$
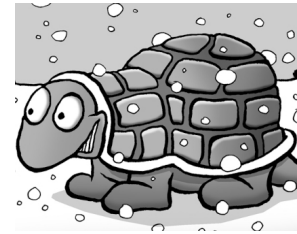
2. $y'' + y' - 6y = 41e^{-3x}$

3. $y'' - 2y' + y = -\sin 3x - 2\cos x$

4. $y'' - 5y' = 2x^2 + 5x + 8$

TABLE 4.4.1   Trial Particular Solutions

$g(x)$	Form of y_p
1. 1 (any constant)	A
2. $5x + 7$	$Ax + B$
3. $3x^2 - 2$	$Ax^2 + Bx + C$
4. $x^3 - x + 1$	$Ax^3 + Bx^2 + Cx + E$
5. $\sin 4x$	$A\cos 4x + B\sin 4x$
6. $\cos 4x$	$A\cos 4x + B\sin 4x$
7. e^{5x}	Ae^{5x}
8. $(9x - 2)e^{5x}$	$(Ax + B)e^{5x}$
9. $x^2 e^{5x}$	$(Ax^2 + Bx + C)e^{5x}$
10. $e^{3x}\sin 4x$	$Ae^{3x}\cos 4x + Be^{3x}\sin 4x$
11. $5x^2 \sin 4x$	$(Ax^2 + Bx + C)\cos 4x + (Ex^2 + Fx + G)\sin 4x$
12. $xe^{3x}\cos 4x$	$(Ax + B)e^{3x}\cos 4x + (Cx + E)e^{3x}\sin 4x$

NON-HOMOGENEOUS EQUATIONS (§4.4): FIND y_c AND THE FORM OF y_p

Team effort! For each differential equation, find the complementary function $y_c(x)$, the general solution of the associated homogeneous equation. Then write down the correct form for $y_p(x)$, the particular solution. You do not need to find the unknown constants in $y_p(x)$, but you must identify the correct form, whether in case I (*no duplication of terms in* $y_c(x)$) or in case II (*with duplication*). Feel free to use the table at the bottom of the page.

1. $y'' + 16y = 5 - x$

2. $y'' - 6y' + 5y = 13e^x$

3. $y'' - 4y' + 4y = 2\sin 3x + \cos x$

4. $y'' - 9y' = 3x^2 + 6x + 9$

TABLE 4.4.1   Trial Particular Solutions

$g(x)$	Form of y_p
1. 1 (any constant)	A
2. $5x + 7$	$Ax + B$
3. $3x^2 - 2$	$Ax^2 + Bx + C$
4. $x^3 - x + 1$	$Ax^3 + Bx^2 + Cx + E$
5. $\sin 4x$	$A\cos 4x + B\sin 4x$
6. $\cos 4x$	$A\cos 4x + B\sin 4x$
7. e^{5x}	Ae^{5x}
8. $(9x - 2)e^{5x}$	$(Ax + B)e^{5x}$
9. $x^2 e^{5x}$	$(Ax^2 + Bx + C)e^{5x}$
10. $e^{3x}\sin 4x$	$Ae^{3x}\cos 4x + Be^{3x}\sin 4x$
11. $5x^2 \sin 4x$	$(Ax^2 + Bx + C)\cos 4x + (Ex^2 + Fx + G)\sin 4x$
12. $xe^{3x}\cos 4x$	$(Ax + B)e^{3x}\cos 4x + (Cx + E)e^{3x}\sin 4x$