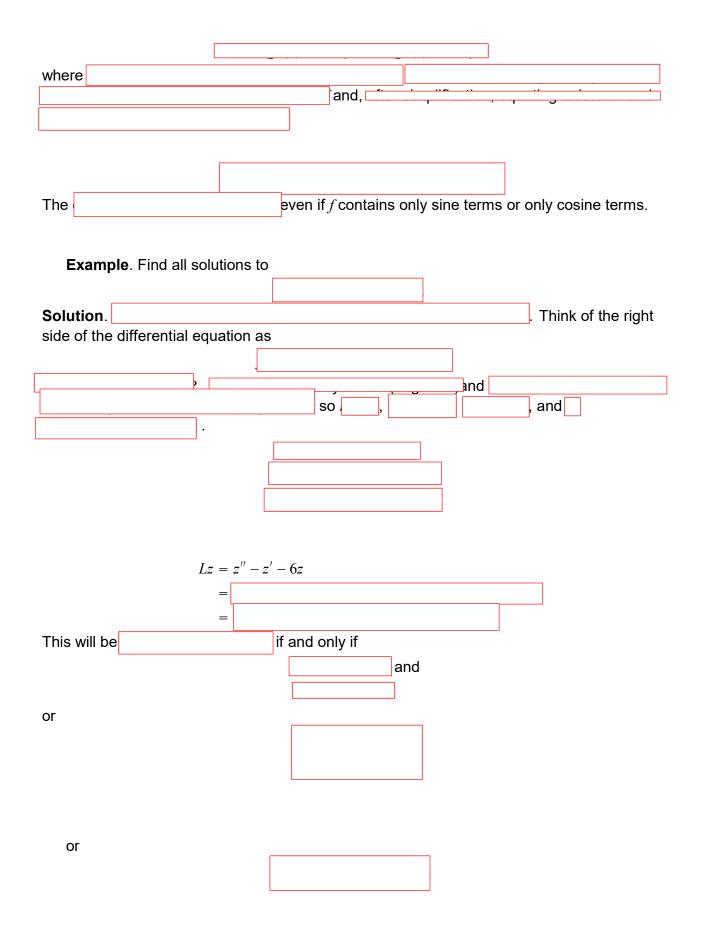
Section 3.5 The Method of Undetermined Coefficients

Note . In this section, L will be a constant coefficient second order linear differential	
operator with	
where each of a , and b is a real number. P will be the polynomial associated with or	
characteristic polynomial for L .	
onditable notification by the first part of the	
When L is a second order $\begin{tabular}{cccccccccccccccccccccccccccccccccccc$	
particular z solution to the nonhomogeneous equation	
can be predicted. This form will contain coefficients that must be determined in order to	
specify the solution.	
specify the solution.	
Definition . Saying that r_0 is a zero of P means that	
Saying that r_0 is a zero of for P means that	
= where .	
Saying that r_0 is a zero of for P means that	
Cons 4 If	
Case 1. If	
where (_
there will be a particul	a
solution z satisfying	
of the forms	
of the form	

Example. Find all solutions to
Solution. Here so the zeros of P The number
There will be a particular solution z of the
form $Lz = z'' - z' - 6z = $
This will be the right side of the given differential equation if and only if
Thus there is a particular solution z given by
Since the zeros of the associated polynomial are a fundamental pair for the related homogeneous or reduced equation is . Thus
if and only if
Case 2. If
where and (
be a particular solution z satisfying $ Lz = f $), there will
of the form
where The values

of the coefficients are found	and after
Example . Give the form of a particular solution to	
Solution. Here	The number
	There will
be a particular solution <i>z</i> of the form	
Case 3. If	
Case 5. II	
where and	let
], [
	. There will be a
particular solution z satisfying	C
of the form	=f
or the form	
where	
of the	
	- Cinima di Cini
Case 4 . Suppose that each of α and β is a	a real number with $\beta \neq 0$ and
where each of	
, ,	$igcup (Since L \ is\ second)$
order with real coefficients, this will mean $m = 0$ be possible.) There will be a particular solution	
i.e.	
of the form	_



Thus
and y is a solution to the given differential equation if and only if
Example. Find all solutions to
Solution. so P has only one zero, and it is of
The right side of the differential equation is
Thus a particular solution z will be of the form
SO
Computation shows that $z' = $ $z'' = $
and
and $Lx = z'' + 2z' + z = \begin{bmatrix} \vdots \\ \vdots \\ \vdots \end{bmatrix}$
and $Lx=z^{\prime\prime}+2z^{\prime}+z= $
Lx = z'' + 2z' + z =
$Lx=z^{\prime\prime}+2z^{\prime}+z= $

for then it can be	used to solve	
and a particular solution will predicted form.		Use
Example . Give the form	of a particular solution to	
Solution.		
Note that the		so the
Note. If <i>L</i> is considered above, the solve	or if f is	of the types must be used to
Example . I he method of und	determined coefficients cannot be	used to solve

Additional Examples: See Section 3.5 of the text and the notes presented on the board in class.

Suggested Problems. Do the odd numbered problems for Section 3.5. The answers are posted on Dr. Walker's web site.