

(17)

Example Find a particular solution to

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

Here  $\alpha=0, \beta=1$ .

$r=i$  is not a root of aux. eqn  $r^2+r+1=0$   
since  $i^2+i+1 = -1+i+1 = i \neq 0$ .

So the form of

$$y_p = \cos x (Ax + B) + \sin x (Cx + D).$$

Example Find the form of a particular solution to

$$y'' - 2y' + 5y = e^x \sin 2x.$$

A.E:

$$r^2 - 2r + 5 = 0$$

$$r = \frac{2 \pm \sqrt{4 - 20}}{2} = 1 \pm \sqrt{-16/4} = 1 \pm 2i.$$

As  $r=1+2i$  is a root of the aux. eqn.

So the form of  $y_p = x (A e^{(1+2i)x} \cos 2x + B e^{(1+2i)x} \sin 2x)$ .