WRITE YOUR NAME:

MAP 2302 Quiz 12
Tuesday October 15th

Find a particular solution of the differential equation.

$$y' + y = 3e^x \sin x + 4e^x \cos x$$

Try $y = Ae^x \sin x + Be^x \cos x$

(PRODUCT, PRODUCT)

$\Rightarrow y' = Ae^x \sin x + Ae^x \cos x + Be^x \cos x - Be^x \sin x$

$= (A-B)e^x \sin x + (A+B)e^x \cos x$

Plug into DE:

$\underbrace{(A-B)e^x \sin x + (A+B)e^x \cos x}_{y'} + \underbrace{Ae^x \sin x + Be^x \cos x}_{y} = 3e^x \sin x + 4e^x \cos x$

$(2A-B)e^x \sin x + (A+2B)e^x \cos x = 3e^x \sin x + 4e^x \cos x$

$\Rightarrow$ (i) $2A - B = 3 \xrightarrow{\times 2} 4A - 2B = 6$

(ii) $A + 2B = 4 \qquad A + 2B = 4$

$5A = 10 \Rightarrow A = 2 \Rightarrow B = 1$

Answer: $y = 2e^x \sin x + e^x \cos x$

or $e^x(2\sin x + \cos x)$