#4: \[2y''(x) - 6y'(x) + y(x) = \sin x / e^{4x}\] Method applies.

The right hand side is indeed a product of trig and exp, namely \(e^{-4x} \sin x\).

You'd try \((A \cos x + B \sin x) e^{-4x}\) (after confirming that \(-4 \pm i\) is not a root of the char. eqn)

#5: \[y''(0) + 3y'(0) - y(0) = \frac{1}{\cos \theta}\] Method does NOT apply since \(\cos \theta \neq 0\) is in the denominator.

#6: \[2 \cos''(x) - 3 \cos(x) = 4x \sin^2 x + 4x \cos^2 x\]

You are expected to recognize that this \(= 4x\) Method applies, you try \(\cos(x) = Ax + B\).

Note: if you had only \(4x \sin^2 x\) on the right hand side, the method would still apply. A naive attempt would be \((Ax + B) \sin^2 x + (Cx + D) \sin x \cos x + (Ex + F) \cos^2 x\) A wiser attempt would note that \(\sin^2 x = \frac{1 - \cos 2x}{2}\) and try \(Ax + B + (Cx + D) \sin 2x + (Ex + F) \cos 2x\) (different \(A, \ldots F\) from the \(A, \ldots F\) in the other attempt).

Using the trig formula clarifies that this attempt works unless \(0 \pm 2i\) is a root of the char. eqn. (which trouble is indeed avoided in this example)

#7: \[ty'' - y' + 2y = \sin 3t\] Method does NOT apply

This is the culprit: undet'd coeff's method requires const. coeff ODE.