MATH 046 020-QUIZ 5, SPRING 2018

Name: KEY

1 (6 pts). Consider the second order linear ODE $y'' - 4y = 0$. Show that

(1) $\{e^{2x}, e^{-2x}\}$ are two solutions of the given equation.

(2) $\{e^{2x}, e^{-2x}\}$ are linearly independent.

Then find the general solution of the given equation by using the information above.

\# See other version for solution

2 (4 pts). What can one say about the general solution of $y'' - 8y' = 0$ if two particular solutions are known to be $y_1 = e^{8x}$ and $y_2 = 1$?

Assume $y_1(x) = e^{8x}$ and $y_2(x) = 1$ are solutions.

$$W = \begin{vmatrix} y_1 & y_2 \\ y_1' & y_2' \end{vmatrix} = \begin{vmatrix} e^{8x} & 1 \\ 8e^{8x} & 0 \end{vmatrix} = -8e^{8x} \neq 0$$

$\Rightarrow$ solutions y_1 and y_2 are linearly independent

Since $y'' - 8y' = 0$ is linear and $W \neq 0$, then the linear combination of solutions is a solution,

then $\boxed{y(x) = c_1 e^{8x} + c_2}$