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**MATH 33B QUIZ 4**
**FRIDAY, MAY 3RD 2019**

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**Problem 1.** Circle TRUE or FALSE to the following statements. No justification needed for now. (However you should make sure you can justify them if asked in the future.)

✓ (1) If $y_1(x)$ and $y_2(x)$ are differentiable functions with Wronskian $W_{y_1,y_2}(x) = 0$ for all $x$ in the interval $I$, then $y_1$ and $y_2$ are linearly dependent on the interval $I$. TRUE / FALSE

✓ (2) If $y_1(x)$ and $y_2(x)$ are differentiable functions that are linearly dependent on the interval $I$, then their Wronskian $W_{y_1,y_2}(x) = 0$ for all $x \in I$. TRUE / FALSE

✓ (3) If $y_1(x)$ and $y_2(x)$ are both solutions to $y'' + p(x)y' + q(x)y = 0$ on interval $(-1, 1)$, then it is possible for their Wronskian to be $W(x) = xe^x$. TRUE / FALSE

✓ (4) If $y_1(x)$ and $y_2(x)$ are both solutions to $y'' + p(x)y' + q(x)y = 0$ on interval $I$, and their Wronskian $W(x)$ is zero for **some** $x_0 \in I$, then $y_1$ and $y_2$ are linearly dependent on $I$. TRUE / FALSE

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**Problem 2.** Find a fundamental solution set to $y'' + 2y' + 3y = 0$.

$r^2 + 2r + 3 = 0$

$r = \frac{-2 \pm \sqrt{4 - 12}}{2} = \frac{-2 \pm 2i}{2} = -1 \pm \frac{3}{2}i$

$y_1(x) = e^{-x}\sin(\frac{3}{2}x)$

$y_2(x) = e^{-x}\cos(\frac{3}{2}x)$

algebra error!

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(If you are done, do something creative on the back of the page.)