

Chapter 5.1

Linear Algebra with applications to differential equations

College of the Atlantic. Winter 2019

1. (Re)introduce yourself to your partners and briefly share anything noteworthy or exciting that's happening this weekend.
2. Consider the differential equation

$$y'' - 2y' + y = 0. \tag{1}$$

- (a) Verify that $y_1 = e^x$ and $y_2 = xe^x$ are solutions to the differential equation.
- (b) Find the solution to the differential equation that has $y(0) = 3$ and $y'(0) = 1$.

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3. Compute the Wronskian of e^x and xe^x . Are the two functions linearly independent?
4. Let $g(x)$ be some unspecified function, and let $f(x) = kg(x)$, where k is a constant. Compute the Wronskian of $f(x)$ and $g(x)$. Are the two functions linearly independent?
5. Compute the Wronskian of e^{r_1x} and e^{r_2x} . Are the two functions linearly independent? What if $r_1 = r_2$? What if $r_1 = 0$?

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6. Find the general solution of $2y'' - 7y' + 3y = 0$.
7. Find the general solution of $y'' + 2y' = 0$.