

Math 1B: Discussion 4/22/19

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Review of Complex Numbers

Evaluate

$$(1 - \sqrt{3}i)^{200}$$

and write it using Cartesian coordinates.

Convert $-\sqrt{2} + \sqrt{2}i$ and $2\sqrt{3} - 2i$ to polar form, and find their product in polar form.

Linear Combination of Solutions

Suppose that y_1 and y_2 are both solutions of the second order homogeneous linear ordinary differential equation

$$ay'' + by' + cy = 0$$

for constants a, b, c . Show that $C_1y_1 + C_2y_2$ is also a solution.

Or more concretely, show that $y = e^{-x}$ and $y = e^{2x}$ are both solutions to the second order homogeneous linear ordinary differential equation

$$y'' - y' - 2y = 0$$

Then, check that every function of the form $y = C_1e^{-x} + C_2e^{2x}$ is also a solution.

Linear Independence

- Are e^x and e^{3x} linearly independent?
- Are $\cos(4x)$ and $\sin(4x)$ linearly independent?
- Are e^x and $-e^x$ linearly independent?
- Are $\sin(3x)$ and 0 linearly independent?
- Are e^x and e^{-x} linearly independent?

Homogeneous Second Order Linear Equations

Solve the following second order linear homogeneous differential equations.

$$y'' - 5y' + 6y = 0$$

$$y'' + 4y' + 4y = 0$$

$$y'' + 3y' + 6y = 0$$

$$2y'' + y' - 3y = 0$$

$$3y'' + y' + 2y = 0$$

$$4y'' - 4y' + y = 0$$

$$3y'' - 3y' + 5y = 0$$