

Quiz 1

Monday, June 29, 2020

4:28 PM

Math 4B Summer 2020

Quiz #1

No calculators

PRINT NAME

PERM NUMBER

TA: ☐ Trevor

☒ Fabio

Time: ☒ 4:30

☐ 6:30

☐ 5:30

☐ 7:30

1. In your own words, what does it mean for a differential equation to be linear?

A function has y and all of its derivatives raised to the power 1.

$$\text{Example } a_0 y' + a_1 y'' + a_2 y''' \dots = C$$

2. Suppose you have a linear ordinary differential equation of order 2 given by

$$a(t)y'' + b(t)y' + d(t)y = 0$$

and you also have two functions y_1 and y_2 that are solutions to the differential equation. Show that $C_1 y_1 + C_2 y_2$ is also a solution. (C_1 and C_2 are constants.)

$$a(t)y'' + b(t)y' + d(t)y = 0$$

If y_1 and y_2 are sols:

$$y = C_1 y_1 + C_2 y_2$$

$$a(t)y_1'' + b(t)y_1' + d(t)y_1 = 0$$

$$y' = C_1 y_1' + C_2 y_2'$$

$$a(t)y_2'' + b(t)y_2' + d(t)y_2 = 0$$

$$y'' = C_1 y_1'' + C_2 y_2''$$

$$a(t)(C_1 y_1'' + C_2 y_2'') + b(t)(C_1 y_1' + C_2 y_2') + d(t)(C_1 y_1 + C_2 y_2) = 0$$

$$a(t)C_1 y_1'' + b(t)C_1 y_1' + d(t)C_1 y_1 + a(t)C_2 y_2'' + b(t)C_2 y_2' + d(t)C_2 y_2 = 0$$

$$C_1 (a(t)y_1'' + b(t)y_1' + d(t)y_1) + C_2 (a(t)y_2'' + b(t)y_2' + d(t)y_2) = 0$$

$$C_1(0) + C_2(0) = 0$$

$$0 = 0 \checkmark \therefore C_1 y_1 + C_2 y_2 \text{ is also a solution}$$