Math 4B Summer 2020
Quiz #3

No calculators

PRINT NAME

PERM NUMBER

Put your answer in the box provided.

TA: ☐ Trevor ☐ Nick

Time: ☐ 4:30 ☐ 5:30 ☐ 6:30 ☐ 7:30

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1. What is the keyword?

2. Consider the following homogeneous second-order differential equation with constant coefficients:

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

Consider b to be a constant whose value we will decide later.

(a) Solve the characteristic equation in terms of b.

$r =$

(b) Choose three different values of b such that the fundamental solution sets are distinct. [Hint: Choosing b so that the discriminant is a whole number gives you 3 very nice values.]

$b =$ $y_1 =$ $y_2 =$

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3. This will introduce you to the idea behind a topic in the upcoming week(s). For each of the following functions, find

$$3y'' + y' - 2y.$$

(a) $y(t) = 3e^t$

$3y'' + y' - 2y =$ ☐

(b) $y(t) = 3t^2 + 5t - 2$

$3y'' + y' - 2y =$ ☐

(c) $y(t) = 4\sin(t)$

$3y'' + y' - 2y =$ ☐

(d) $y(t) = 7\cos(t)$

$3y'' + y' - 2y =$ ☐

4. Notice how in the previous problem, the functions remained the same type: exponentials, polynomials, trig functions, etc. Let's use this observation to find a particular solution to the **non**homogeneous equation

$$y'' - 3y' - 4y = 3e^{2t}.$$

(a) Let $y(t) = Ae^{2t}$, and consider A to be a constant whose value we will decide later. Plug y into the differential equation.

$$y'' - 3y' - 4y = \boxed{}$$

(b) Find the value of A so that your answer to (a) is equal to $3e^{2t}$.

$$A = \boxed{}$$

(c) Check that Ae^{2t} (with your value from part (b) plugged in) is a solution to $y'' - 3y' - 4y = 3e^{2t}$.