

Math 217 - September 24, 2010

Solutions

- Linear 2nd order equations

1. Check that the given solutions are really solutions

(a) $y'' + y = 0$, solns: $y_1 = \sin x$, $y_2 = \cos x$, $y_3 = \sin x + \cos x$.

(b) $y'' - 2y' + y = 0$, solns: $y_1 = e^x$, $y_2 = xe^x$, $y_3 = 2e^x - xe^x$.

2. **Math Circle Problem 1** A group of poor Wash U students took a bus ride. At the end of the ride, each student paid the driver with the exact bus fare and with exactly 5 coins. The driver received exactly \$21.83. How many pennies did the driver receive?

3. **Math Circle Problem 2** Consider the number: 123456789101112...5960

(a) What is the largest number that can be produced by crossing out 100 digits?

(b) What is the smallest number that can be produced by crossing out 100 digits? A number that begins with a 0 is allowed. For example, 011 would be interpreted as 11.

Lecture Problems

4. Consider $y'' + y = 0$. Show that $y = c_1 \cos x + c_2 \sin x$ solves the differential equation. Find c_1 and c_2 to satisfy the initial condition $y(0) = 1$, $y'(0) = 2$

5. Consider $y'' + y = 0$. Show that $y = c_1 \sin x + c_2 3 \sin x$ solves the differential equation. Find c_1 and c_2 to satisfy the initial condition $y(0) = 1$, $y'(0) = 2$