Math 305 Homework Set 1 Spring 2017

Due Monday, April 10

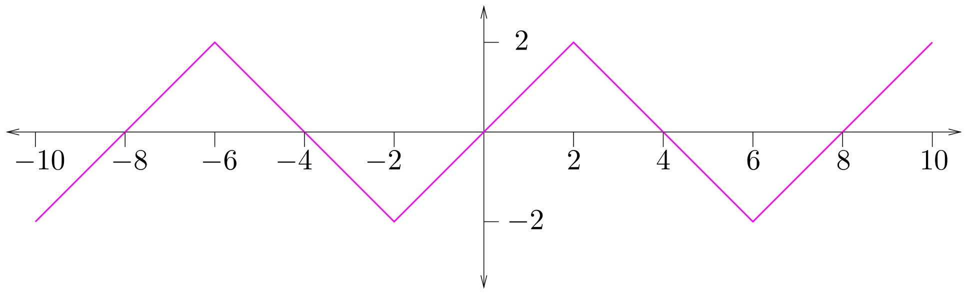
**I.** Find the general solution to each of the following.
1. $(e^x \sin y - 2y \sin x) + (e^x \cos y + 2 \cos x)y' = 0$.
2. $t^2 y' + 2ty - y^3 = 0$.
3. $y' - 2y = 4 - x$.
4. $2y' - y = e^{x/3}$.

**II.** Find all solutions to the following boundary value problems (this is based on Section 10.1).
1. $y'' + y = 0$ with $y(0) = 0$, $y(\pi) = 0$.
2. $y'' + y = 0$ with $y(0) = 0$, $y(\pi/3) = 0$.
3. $y'' + 3y = 0$ with $y(0) = 0$, $y(\pi) = 0$.
4. For which values of $\gamma$ will $y'' + \gamma y = 0$, $y(0) = 0$, $y(\pi) = 0$ have nontrivial solutions? Explain.
5. $y'' + y = 0$ with $y'(0) = 0$, $y'(\pi) = 0$.

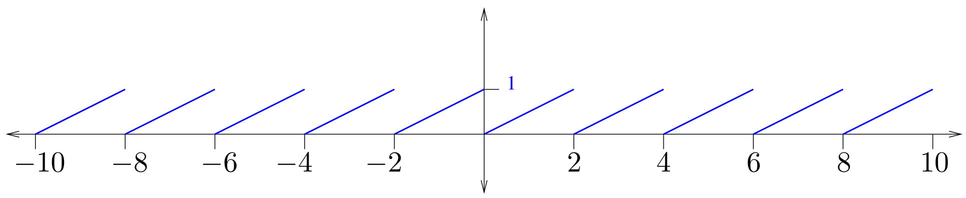
More on next page.

**III.** Find the Fourier series of each of the functions shown below. (Make sure you are using the correct value for $L$.) You can do the integration with a computer or calcuator, but indicate when you have done so. Write out at least the first 10 terms.

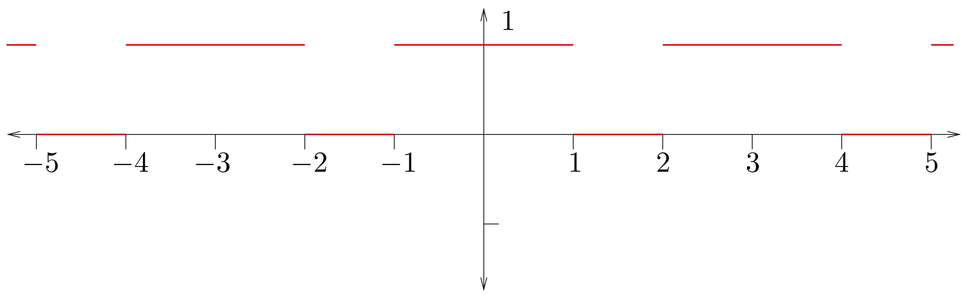
1.




2.




3.




**III.** For #1 above use a compute to plot the partial sums for $N = 1, 2, 5$, and 10.