Questionnaire – April 11, 2014

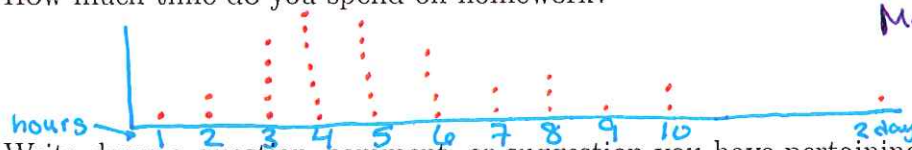
1. How often do you go to tutorial?

   almost always : 1 occasionally : 4 once or twice : 6 never : 10

2. If you have been to tutorial, how helpful has it been?

   very helpful : 2 somewhat helpful : 4 a little helpful : 3.5 not helpful : 1.5

3. How much time do you spend on homework?



Many people gave a range of hrs/week. There is a red dot for each person whose range overlapped w/ it.

4. Write down a question, comment, or suggestion you have pertaining to the course.

See below.

5. Find the general solution to the following differential equation: $y'' - 2y' + 2y = e^t + t$.

This problem is worked out in detail below.

How your peers did:

Correct (except maybe tiny algebra mistakes) : 9

ran out of time / got stuck / went wrong somewhere : 12

$$y'' - 2y' + 2y = e^t + t$$

Characteristic eqn: $r^2 - 2r + 2 = 0$

roots: $r = \frac{-b \pm \sqrt{b^2-4ac}}{2a} = \frac{2 \pm \sqrt{4-4(2)}}{2} = 1 \pm \frac{\sqrt{-4}}{2} = 1 \pm i$

homogeneous solution: $y_h(t) = C_1 e^t \cos(t) + C_2 e^t \sin(t)$

$g(t) = e^t + t$

Let $g_1(t) = e_t$

$g_2(t) = t$.

Want to find a particular solution for each of

① $y'' - 2y' + 2y = e^t$ and ② $y'' - 2y' + 2y = t$

using Method of undetermined coefficients.

① For $y'' - 2y' + 2y = e^t$, guess $Y_{p_1}(t) = A e^t$

then $Y_{p_1}'(t) = A e^t$ and $Y_p''(t) = A e^t$.

Plugging in, we get $Ae^t - 2Ae^t + 2Ae^t = e^t$

$$Ae^t = e^t$$

$$A = 1$$

So $Y_{p_1}(t) = e^t$.

But we're not done yet!

② For $y'' - 2y' + 2y = t$, guess $Y_{p_2}(t) = Bt + C$

then $Y_{p_2}'(t) = B$

$Y_{p_2}''(t) = 0$

Plugging in,

$$0 - 2(B) + 2(Bt + C) = t$$

$$\underbrace{2Bt}_{1} + \underbrace{2C - 2B}_{0} = t + 0$$

So $2B = 1 \Rightarrow B = \frac{1}{2}$

$2C - 2B = 0 \Rightarrow B = C$

$C = \frac{1}{2}$

So $Y_{p_2}(t) = \frac{1}{2}t + \frac{1}{2}$.

Finally, general solution is $y(t) = y_h(t) + Y_{p_1}(t) + Y_{p_2}(t)$.

$$\boxed{y(t) = c_1 e^t \cos t + c_2 e^t \sin t + e^t + \frac{1}{2}t + \frac{1}{2}.}$$

Questionnaire Responses – April 11, 2014

1. **When we talk about several theorems/general concepts one after the other, with no examples to clarify, I get lost in definitions and wording:** The first half of class today was concept/theorem-heavy compared with previous classes. It was also pretty fast paced. For Theorem 4.1.2 which we covered today, please see the example I've posted online ("Example from April 11"). I hope this clarifies this theorem and how we use it.

2. **Will exam questions be designed to challenge/extend beyond the material, or check our understanding of fundamental concepts?** You should expect a mixture of these on the exam – some very straightforward if you understand the concepts and a few more challenging questions.

3. **Roadmaps are great!** Great! I've posted one for second order on the website.

4. **I wish the lecture notes were online.** Hm. If someone in the class has neatly written notes and are willing to share them, I'm happy to make a copy and post them.

5. **More online practice problems.** I'm not sure what this means. However, under "Exams" on the website, I have posted previous exam solutions from Math 23 a few years ago. I will also be posting recommended practice problems for exam-review.

6. **Reviewing what we learned at the beginning of the previous class is helpful.** Noted.

7. **Not really following matrices, don't feel comfortable taking determinants.** You are probably not the only one. Much of our motivation for today involved matrices, but we haven't yet talked much about how to actually work with them. On Monday, I'll talk about many of the basic ideas from linear algebra, including how to take determinants. We will approach this from a "only what we need to know for this course" perspective. Here's what I already assume you know about matrices: (1) how to take the determinant of a 2×2 matrix, (2) multiplying a matrix times a vector, (3) that a system of equations can be solved only if the determinant is nonzero (which we mentioned today). If this doesn't sound right, let me know and we'll review some of these concepts on Monday as well.

8. **I want to come to office hours, but I never have time to.** I now have an office hour scheduled during the x-hour for the class. Also, you can schedule an office-hour appointment with me or email me your questions.

9. **Been enjoying it so far/seems straightforward/doing great/liking it/good.** Great!