Questionaire – March 28, 2014

1. How comfortable are you with the course material so far?
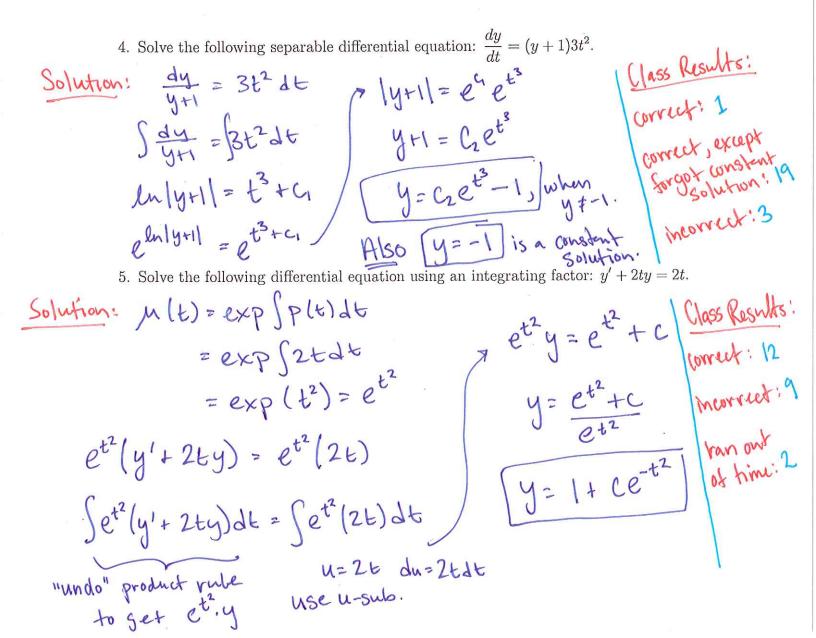
   very much: 10.5   somewhat: 10.5   not so much: 1   not at all: 1

2. Have you started the homework yet?

   yes: 14   sort of: 1   no: 8

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

   See next page for responses.

4. Solve the following separable differential equation: $\frac{dy}{dt} = (y+1)3t^2$.

Solution:

$$\frac{dy}{y+1} = 3t^2\, dt$$

$$\int \frac{dy}{y+1} = \int 3t^2\, dt$$

$$\ln|y+1| = t^3 + c_1$$

$$e^{\ln|y+1|} = e^{t^3 + c_1}$$

$$|y+1| = e^{c_1} e^{t^3}$$

$$y+1 = C_2 e^{t^3}$$

$$\boxed{y = C_2 e^{t^3} - 1,} \text{ when } y \neq -1.$$

Also $\boxed{y = -1}$ is a constant solution.

Class Results:
correct: 1
correct, except forgot constant solution: 19
incorrect: 3

5. Solve the following differential equation using an integrating factor: $y' + 2ty = 2t$.

Solution:

$$\mu(t) = \exp \int p(t)\, dt$$

$$= \exp \int 2t\, dt$$

$$= \exp(t^2) = e^{t^2}$$

$$e^{t^2}(y' + 2ty) = e^{t^2}(2t)$$

$$\int e^{t^2}(y' + 2ty)\, dt = \int e^{t^2}(2t)\, dt$$

$$e^{t^2} y = e^{t^2} + c$$

$$y = \frac{e^{t^2} + c}{e^{t^2}}$$

$$\boxed{y = 1 + Ce^{-t^2}}$$

"undo" product rule to get $e^{t^2} \cdot y$

$u = 2t \quad du = 2t\, dt$
use u-sub.

Class Results:
correct: 12
incorrect: 9
ran out of time: 2

Questionaire Responses – March 28, 2014

1. **Exact definition of a differential equation?** It's a mathematical equation which contains derivatives.

2. **More explanation of Picard's Theorem:** We will see this Monday (with examples).

3. **Are we ever going to do Laplace transform?** Unfortunately, that isn't on our current syllabus.

4. **Confused by some homework problem:** Please come to office hours or tutorials! Also, for small questions or clarifications, feel free to email me questions. I will try to respond within a reasonable amount of time.

5. **Problem with the applet:** Please come to office hours or tutorial or make an appointment (or email me). There are a few different applets, so this question is best answered one-on-one. **Let's do an example with the applet in class:** Good idea!

6. **Are homework questions representative of exam material?** Good question. We haven't written the exams yet, so I can't give you a definite answer. I will post some previous exams on the website so you can get an idea of what to expect.

7. **I have to review various calculus techniques/assume we remember terminology, but not methods (from calculus):** We do use a lot of the techniques from calculus. We unfortunately don't have enough time to review all the techniques we will use in class and so I do have to assume you know some of these things during class. However, if there are techniques you're having trouble with, please come to office hours (or set an appointment) or tutorials and we can talk about them.

8. **We talk a lot about how to apply theorems and not as much about why the theorems are true:** We can talk about the ideas behind theorems and the intuition about where they came from (for example, "solving an exact differential equation is like undo-ing implicit differentiation" and "integrating factors work because of the product rule"), but this isn't a proofs course and we will not go through the proofs of theorems in detail. As I mentioned, this course is very computational.

9. **Give more examples/more examples, like tricky examples/more examples would be helpful/I like examples:** I like examples too! We will continue to do examples as the course progresses. Because of the pace of the course, we will do as many as possible, but perhaps not as many as you're hoping for. Please also see your textbook for examples (different from those in class) which have been worked out in detail.

10. **So far so good/I like it so far/doing great so far:** Great!