

Differential Equations – Advanced Problem Set 1

Professor:

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Directions: Do the following book problems

Section 1.4: 65 (HINT: use equation (19) in section 1.4)

There are additional notes online and an example in the book about Newtons Law of Cooling.

Section 1.5: 29

For number 29 it is asking you to solve the ODE just like a normal first order ODE, but then you will see that you can't actually integrate the RHS. So you can leave your solution in the form of $y(x) = \text{an integral}$. That very special integral is the error function, $\text{erf}(x)$ as defined in your book. You can actually write your solution to look like $y(x) = (\text{stuff}) \cdot \text{erf}(x)$.

Other Notes:

1. **If you are a math major who has taken real analysis** you can choose to skip these problems instead do the proof of the existence and uniqueness theorem. You can follow the method from the appendix in our book but add your own words to help describe what is going on. Say in your assignment that this is what you are doing so your homework is graded appropriately!