Homework II

1. This is a similar problem to Problem 1 of Homework I. Again put a potato into an oven. The temperature of the potato at $t=0$ is $T\_{0}$ and it will heat up. Denote the temperature at $t$ as $T\left(t\right)$. But this time the temperature of the oven **is not a constant** but $Q\left(t\right)=Q\_{0}e^{1.1∙ht} (for positive h). Q\_{0}>T\_{0}$. Likewise, we can write down an equation for the change of potato temperature:

$$\frac{dT}{dt}=-h\left[T\left(t\right)-Q\left(t\right)\right]$$

Solve $T\left(t\right)$.

Hint: Use the method of integrating factor.

1. Find the general solution $x\left(t\right)$ of the equation of

$$x^{'}+\frac{2}{t}x=t$$

Hint: Use the method of integrating factor.

1. Arfken Exercise 7.6.16 (p372)

Hint: Use the method of Wronskian.

1. Arfken Exercise 7.6.19 (p373)
2. Find the general solution $x\left(t\right)$ of the equation of

$$x^{''}+2x^{'}+5x=0$$

using the damp oscillation formula we gave in class.

1. Solve the equation of

$$x^{''}+4x^{'}+3x=0$$

And initial conditions: $x\left(0\right)=1, x^{'}\left(0\right)=0$. (After class on Sep. 23)