

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 $T(t)$. But this time the temperature of the oven **is not a constant** but $Q(t) = Q_0 e^{1.1 \cdot ht}$ (for positive h). $Q_0 > T_0$. Likewise, we can write down an equation for the change of potato temperature:

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

Solve $T(t)$.

Hint: Use the method of integrating factor.

2. Find the general solution $x(t)$ of the equation of

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

Hint: Use the method of integrating factor.

3. Arfken Exercise 7.6.16 (p372)

Hint: Use the method of Wronskian.

4. Arfken Exercise 7.6.19 (p373)

5. Find the general solution $x(t)$ of the equation of

$$x'' + 2x' + 5x = 0$$

using the damp oscillation formula we gave in class.

6. Solve the equation of

$$x'' + 4x' + 3x = 0$$

And initial conditions: $x(0) = 1, x'(0) = 0$. (After class on Sep. 23)