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 is and it will heat up. Denote the temperature at as . But this time the temperature of the oven **is not a constant** but . Likewise, we can write down an equation for the change of potato temperature:

Solve .

Hint: Use the method of integrating factor.

Sol: The integrating factor would be

Multiply the whole equation by the integrating factor :

Integrate and add a constant :

1. Find the general solution of the equation of

Hint: Use the method of integrating factor.

Sol: The integrating factor would be

Multiply the whole equation by the integrating factor :

Integrate and add a constant :

1. Arfken Exercise 7.6.16 (p372)

Hint: Use the method of Wronskian.

Sol:

Note that constants do not matter.

1. Arfken Exercise 7.6.19 (p373)
2. Find the general solution of the equation of

using the damp oscillation formula we gave in class.

Sol: Guess the solution is : and plug it into the equation:

The unknown satisfies the algebraic equation:

There are two real solutions:

For, give usone complex solution:

The real part and the imaginary part are two real solutions. Note that gives usthe same real solutions.

Hence The general solutions are their linear combination:

1. Solve the equation of

And initial conditions: . (After class on Sep. 23)

Sol: Guess the solution is : and plug it into the equation:

The unknown satisfies the algebraic equation:

There are two real solutions:

We get two solutions and the general solutions are their linear combination:

Put in the initial conditions: :