HINT FOR HW #1

- Problem 1. You need to find three sets of the solutions, or three sub-questions. Note that, for the last one, it may have no solution indicating that we need more points to get a consistent finite difference formula.
- Problem 2. Consider both the stability and consistency. Is the boundary condition used in the scheme?
- Suggestions for Problem 3. You can use Maple or Matlab symbolic function to find $f(x)$. Write separate matlab function u.m, du.m. For example, you can edit a text file called u.m with

```
function y = u(x)
y = exp(-x)*(x-1)^2;
```

  Note that you should NOT use beta.m since beta is a Matlab built-in function. Instead, you can use my_beta.m

```
function y = my_beta(x)
y = (1+x*x);
```

  You can write a matlab script file, say *my_main.m* as we did in class

```
n=80;
a=2; b=-3;
c = a*u(1) + b*du(1);
....
```

  Note that, the parameters a, b, and c really should be α, β, and γ using the notations in my notes; and $\beta(x)$ should be $p(x)$.

  The ghost point method for the mixed boundary condition should be

$$aU_n + b\frac{U_{n+1} - U_{n-1}}{2h} = c$$

  from which you solve for U_{n+1} and plug it into the 3-point central finite difference equation at $x = x_n$.

For the programming part of the HW, you should arrange, edit your outputs, plots using the following format:

- The problem. What do we know and what do we want to find.
- The numerical method along with any derivation if there is any.
- Results and analysis. Please label your plots, tables, etc.
- Analysis and conclusions that you can get from your results.

The purpose of this process is to start write papers or technical reports. It is important for you to submit your compute codes, that is, those .m files to Wolfware.