Numerical Method
Homework-2
Due Date: May 17, 2013 (through Ninova)

Q1-50 points) Write a quadratic spline function in MATLAB. Your function should look like the below structure.

yy=quadratic_spline(X, Y, xx);

Given points are (x_1, y_1), (x_2, y_2), (x_3, y_3) … (x_n, y_n).

Vector X contains $[x_1 \; x_2 \; x_3 \; … \; x_n]$.

Vector Y contains $[y_1 \; y_2 \; y_3 \; … \; y_n]$.

Your quadratic_spline function generates a function that passes through all given points and uses quadratic spline method. xx is input vector of your generated function, yy is output vector of corresponding input xx.

Example usage

```
>> X=[2 4 1.2 4.8 7.2 9 11];
>> Y=[-4 2.6 1.5 8.4 -1.1 2 3];
>> xx=1:0.001:11;
>> yy=quadratic_spline(X, Y, xx);
>> plot(xx, yy, X, Y, 'ro');
```

Blue line your generated function. Red bubbles are your given points.
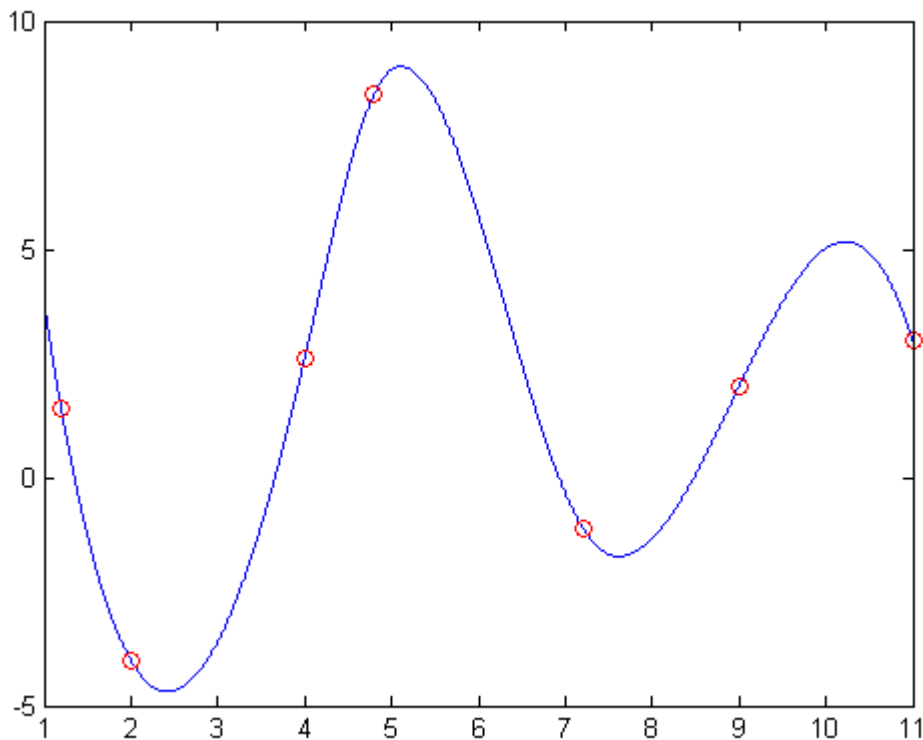
(HINT: MATLAB spline function structure is as same as your quadratic_spline function. However, MATLAB spline function uses cubic spline. Be careful, your function should use quadratic spline method! Please put short explanation each line of your code. No report required for this question.)

Q2-50 points) This question is a little bit different from generic linear programing model.

Find maximum and minimum value of $(2x_1+3x_2)$

Constraints $\quad x_2 \leq -(x_1)^2+2x_1+15$

$\qquad\qquad x_2 \geq (x_1)^2-4x_1$

(HINT: You can use geometric illustration.)

Q3-10 points BONUS) Think 1 meter fragile bar (cubuk). Unfortunately, this bar falls down. It splits into three pieces. I am trying to make triangle using these pieces. What is the probability of that these three pieces make triangle?

-For example this bar splits 35cm, 25cm and 40cm pieces.
(35+25)>40>|35-25|
(35+40)>25>|40-35|
(40+25)>35>|40-25|
Triangle inequality is satisfied.

-For example this bar splits 22.12cm, 26.98cm and 50.9cm pieces.
(22.12+26.98)>50.9>|22.12-26.98|
49.1>50.9>4.86
Triangle inequality is not satisfied. We cannot make triangle using these pieces.

When bar is broken, length of pieces could be any real number.

Report and MATLAB code submission:
.m file required for Q1. All lines should be explained by short sentence or a few words. Solution of Q2 and Q3 should be in your report. Report and .m file should be in single .zip or .rar file.