

# SM 233. Intro to applied math. Homework 1

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## Submission deadline

**Posted** : Thursday, 1/19/2012

**Due** : Thursday 1/26/2012 at 2359

## Problems

- Book 5.1
  - filename : 5.1.m
- Book 5.5
  - filename : 5.5.m
- Book 5.23
  - filename : 5.23.m

- **Ellipse program**

The goal of this project is to produce a plot of the ellipse  $x^2/a^2 + y^2/b^2 = 1$

The program should accept as input the values  $a, b$  and should produce a plot of the ellipse, with the foci labeled. In addition the program should pick a random point on the ellipse and draw line segments to the foci. You should label the lengths of the line segments. A title would be nice too.

What are the foci? These are points  $A, B$  such that for any point  $P$  on the ellipse we have  $|PA| + |PB| = c$  where  $c$  is a constant.

1. Compute the location of the foci  $A, B$
2. Plot the ellipse

- Plot the foci
  - Generate a random point  $P$  on the ellipse and plot the line segments  $PA, PB$ .
  - Generate 100 random points on the ellipse and check that the above condition on the sum of the lengths  $|PA|, |PB|$  is true.
3. filename : `ellipse.m` (script)
  4. Also submit the calculation of the foci by hand on a piece of paper in class.