Mathematics 13 Fall 2005
Instructor : Nikolaos Apostolakis
First Exam
October 19 2005   Name: ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

Please do not turn this cover sheet until instructed to do so.

When the exam begins, please write your name on on the front page.

Please read the questions carefully and write your answers in the spaces provided on the question sheets. Justify your answers. **No credit will be given for unjustified answers.** Simplify your answers as far as you can. If you run out of room for an answer, continue on the back of the page.

Check your working carefully before submitting your paper.

There is a total of 1200 points. The perfect score however is 1000 points. There are 200 points of **Extra Credit**.

Please turn off mobile phones, pagers and other electronic devices.

You are required to turn in *all* of the question sheets with your name written in the top right-hand corner of the first page.

1. (150 points) Add vectors **A** and **B** graphically.
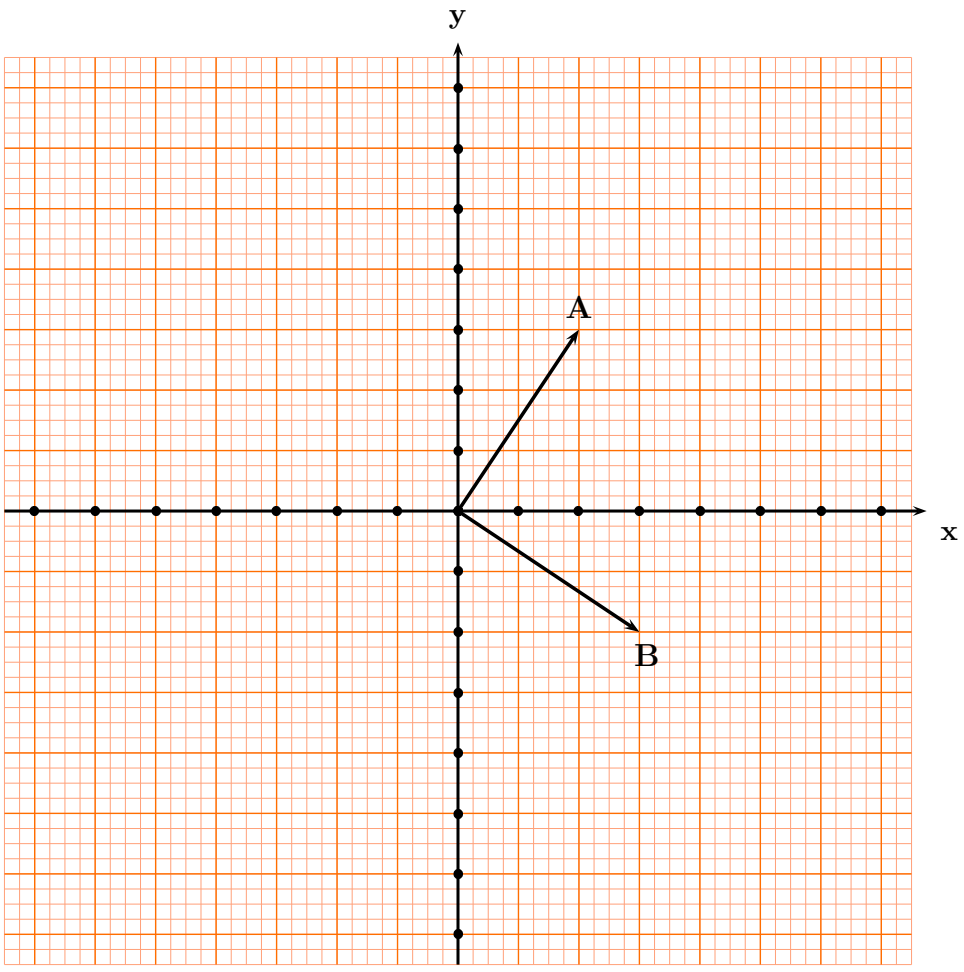
2. (150 points) Find the vector $\mathbf{A} + \mathbf{B}$ if we have the following information for the vectors $\mathbf{A}$ and $\mathbf{B}$.

$$A = 6 \qquad B = 8$$
$$\theta_A = 60° \qquad \theta_B = 120°$$

3. (150 points) Represent the complex number $2 - 2j$ in polar form.

4. (150 points) Represent the complex number $8e^{j\pi/6}$ in rectangular form.

5. (150 points) Find all values of
$$\sqrt[4]{16e^{j\pi/6}}\,.$$

Give your answers in exponential form.

6. (150 points) Perform the following multiplication

$$[5(\cos 25° + j\sin 25°)]\,[3(\cos 65° + j\sin 65°)] \; .$$

Give your answer in rectangular form.

7. (150 points) Find the domain of the following function

$$f(x) = \frac{2x}{3x - 6} + \sqrt{x - 2} + \frac{1}{x - 5}$$

8. (150 points) Graph the following function

$$f(x) = \begin{cases} 3x, & x \leq 1 \\ 2x - 1, & x > 1 \end{cases}$$