Math 421 **Problem Set 3** **Fall 2010**

Due: Monday, Oct. 4 (*delayed*)

1. (a) Sketch the curve $z(t) = t^2 + 2t + i(t+1)$ for $-2 \leq t \leq 2$ by taking the real and imaginary parts $x(t)$ and $y(t)$ and then eliminating the parameter t.

   (b) Now, *without* eliminating the parameter t, draw the same curve by using the *Presentations* function `ComplexCurve`. Keep it simple: you need not include any labels or use distinguishing colors. (See notebook `DrawingComplexObjects.nb`.)

2. Find a piecewise smooth parametrization of the positively-oriented, simple closed curve whose trace is the square with vertices $1, i, -1, -i$. (*Hint:* Begin by parameterizing each side separately with parameter domain $[0, 1]$ or $[0, 2]$. Then "patch" those separate curves together.)

3. (a) Do page 46, Exercise 10.

   (b) Do page 46, Exercise 6. You may use the result of (a).

4. (a) Do page 61, Exercise 3 (c).

   (b) Do page 61, Exercise 4 (b).

5. Do page 63, Exercise 12 (b) with paper and pencil.

   Then check your answer by forming and evaluation suitable *Mathematica* expressions.

   Finally, use *Presentations* to draw (a segment of) the given line and its image. Keep it simple: you need not include any labels or use distinguishing colors. (See notebook `VisualizingFunctions.nb`.)

6. Do page 63, Exercise 15 (c) with paper and pencil and/or with *Mathematica*—that is, with paper and pencil alone, with *Mathematica* alone, or with both together.

   Then use *Presentations* to draw the given triangle and its image. Keep it simple: you need not include any labels or use distinguishing colors. (See notebook `VisualizingFunctions.nb`.)