MATH 1107 Problem Set 1 (Due 2pm Oct 1, 2014 in cuLearn)

Name:_____ ID:_____

Instruction: Submit complete solutions to the following problems. Solutions must be handwritten unless you are a PMC student who has obtained accommodation. Acknowledge all forms of help you have received to complete the problem set on the last page of your submission. If you have received no help whatsoever, write down "no help received" as your acknowledgement. **Submissions that do not contain an acknowledgement will not be marked.**

Throughout this problem set, $\alpha\beta\gamma$ denote the right-most 3 digits of your student ID. For example, for the ID 123456789, $\alpha = 7$, $\beta = 8$, and $\gamma = 9$. **Using the incorrect values for a problem will result in a grade of 0 for the entire problem.**

1. (4 marks) Simplify the following as much as possible: $2\begin{bmatrix}3\\ \alpha\end{bmatrix} - 3\begin{bmatrix}\beta\\ -\gamma\end{bmatrix}$.

2. (6 marks) Let $z = -3.5 + (\alpha + 1)i$. The polar form of z is given by $r \operatorname{cis} \theta$ where r is the modulus of z and θ is in radians satisfying $0 \leq \theta < 2\pi$. Give the values of r and θ rounded to 4 decimal places.

3. (6 marks) Consider the equation $z^2 + (2 - 4i)z - (\gamma + 2i) = 0$.

   (a) (2 marks) Rewrite the equation in the form $z^2 + pz = q$ where p and q are complex numbers.

   (b) (4 marks) Complete the square and write the equation in the form $(z + r)^2 = s$ where r and s are complex numbers. Write r and s in rectangular form using exact values.

4. (4 marks) For what values of q does the following system have a unique solution? Explain.

$$\begin{aligned} x - y + z &= \alpha \\ -2x + 3y + \beta z &= 0 \\ y + qz &= \gamma \end{aligned}$$

Acknowledgement