

You can use this page as a cover sheet for your coursework.

Name: _____

Initials: _____

Student Number: _____

Tutor: _____

- Coursework must have your NAME and INITIALS, STUDENT NUMBER, and name of your Personal Tutor in Elect. Engineering clearly marked on the front. Work without a Student Number may not be marked.
- Use a staple or treasury tag to join sheets, NOT a paper clip.
- Marked work is returned to you via your Tutor in Elect. Engineering.
- Some questions are harder than others. Don't worry if you can't do everything. Hand in whatever you can do. Your coursework counts towards the final mark of the

module.

- Coursework can be *either*: posted in **YELLOW** box in **GROUND** floor of **Mathematics Building** or: handed in at the end of a lecture.
- For Summary Sheets, Lecture Notes and Course Information sheet use the Course web page.
- Rules for late and excused coursework are in the Course Information Sheet.
- Remember: The material you hand in must be your own work. Copying doesn't help you learn!

Coursework Questions

1. Two complex numbers z_1 and z_2 are given by

$$z_1 = 3 - j2, \quad z_2 = 6 - j8.$$

Calculate: (a) $5z_1 - z_2$, (b) $z_1 \bar{z}_2$ (where \bar{z}_2 is the complex conjugate of z_2), and (c) z_2/z_1 .

[4 marks]

2. Express in polar form

- (a) $3 + j5$
- (b) $-6 + j3$
- (c) $-4 - j5$

[3 marks]

3. Find all values of all complex numbers that satisfy the equation

$$z^2 + 4z + 4 - j9 = 0.$$

(You may use $\sqrt{j} = \pm(1 + j)/\sqrt{2}$.)

[4 marks]

4. Solve the equation $z^2 + 2(1 + j)z + 2 = 0$, giving each result in the form $a + jb$, with a and b correct to 2 decimal places.

[4 marks]

5. Using de Moivre's Theorem, show that

$$\cos(4\theta) = 8 \cos^4 \theta - 8 \cos^2 \theta + 1$$

[3 marks]

6. Find all three solution of the equation

$$z^{3/2} = 1 + j.$$

Sketch the positions of the solutions on the Argand diagram.

[6 marks]

7. If $z = x + jy$, determine the equations of the two loci in the Argand diagram, defined by

(a) $\left| \frac{z + 2}{z} \right| = 3$

(b) $\arg \left\{ \frac{z + 2}{z} \right\} = \frac{\pi}{4}$

[6 marks]

Total Marks: [30]

WORK TO BE HANDED IN BY: 5:15PM Thursday DECEMBER 15, 2011

and
HAPPY HOLIDAYS!