PERTH MODERN SCHOOL

UNIT 3C/3D MAS – 2012

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Exceptional schooling. Exceptional students.

TEST 1 – POLAR COORDINATES & COMPLEX NUMBERS

NAME: _____ DATE: _____

[To achieve full marks, working and reasoning should be shown.]
[A maximum of 2 marks will be deducted for incorrect rounding, units, notation, etc.]

This is *Resource Free – 40 minutes for 36 marks*:

1. [2, 2, 2 = 6 marks]

   Determine $\frac{dy}{dx}$ for each of the following

   a) $y = (e^{2x} + 1)^3$

   b) $y = \frac{3x - 1}{x^2 + 1}$

   c) $y = ln[x^2(x + 1)]$

2. [4 marks]
   Express (1, -1) and (1, $\sqrt{3}$) into ***exact*** polar form for $-\pi < \theta \leq \pi$.

3. [2 marks]
   Find the **exact** distance between the points A [6, 25^0] and B [10, 145^0].

4. [3 marks]
   Find the polar equation and the Cartesian equation of a circle of centre (0,0) and radius 3.

5. [1, 2, 2 = 5 marks]
Given $z = 3 - 3i$, calculate:

a) $\bar{z}$

b) z^2

c) $z \times \bar{z}$

6. 6. [1, 1, 1 = 3 marks]
For each of the following, express p in terms of q.

a) $q^4 = \frac{p^3}{8}$

b) $\log_e p = 2 \log_e q$

c) $\frac{e^{2p}}{3} = q$

7. [3 marks]
The Cartesian equation of a circle is $x^2 + y^2 = 10$. Find the polar equation of this circle.

8. [1, 4, 2 = 7 marks]

If $z = \text{cis}\,\frac{\pi}{4}$ and $w = \text{cis}\,\frac{\pi}{6}$,

a) express $\frac{z}{w}$ in polar form,

b) express z, w and $\frac{z}{w}$ in Cartesian form, and

c) give $\frac{z}{w}$ with a rationalised denominator.

9. [3 marks]

Find the polar equation of this curve.