UP SCHOOL OF STATISTICS STUDENT COUNCIL
EDUCATION & RESEARCH
PHILOS SOPHIA

M17_LE5_003

Mathematics 17 — College Algebra and Trigonometry
Fifth Long Examination — First Semester, AY 2011-2012

I. Write TRUE if the statement is correct, and write FALSE otherwise. *1 point each*

1. The graph of $y = \tan^{-1} x$ does not intersect the line $y = \frac{\pi}{2}$.
2. The equation $\sin x \cos x = 1$ has a solution in $\mathbb{R}$.
3. If $y \in [0,1]$, then $0 \le Arc\sin y \le \frac{\pi}{2}$.
4. There exists a triangle whose interior angles are all less than 60^o.
5. If $\omega \in \mathbb{C} \setminus \{1\}$ and ω is a cube root of one, then $1 + \omega + \omega^2 = 0$.

II.

1. Evaluate: $\tan\left(Arc\cos\left(-\frac{12}{13}\right) + Arc\sin\left(\frac{3}{5}\right)\right)$. *4 points*
2. Given: $z_1 = 3cis65^o$, $z_2 = \sqrt{2} + \sqrt{2}i$ and $z_3 = 2cis210^o$. Find:

   (a) the imaginary part of $z_2 + \overline{z_3}$. *3 points*

   (b) $\frac{(z_1)^3 \cdot z_2}{z_3}$ (Express your answer in rectangular form.) *4 points*

III.

1. Solve for all $x \in \mathbb{R}$ such that $Arc\cos(1-2x) + Arc\tan(-1) = Arc\sin\left(\sin\frac{11\pi}{12}\right)$. *4 points*
2. Solve for all $x \in [0,2\pi)$ such that $\cos 2x - 4\cos x = 2\sin^2 x$. *5 points*
3. Solve for all $x \in \mathbb{C}$ such that $z^4 = 8\sqrt{2}(1-i)$. Leave your answer in polar form. *5 points*

IV. Solve the following problems completely. *5 points each*

1. Along a street in a shopping district, Nobita observed that the angle of elevation of a tower is 30^o. Walking 40 m towards the tower and stopping at a noodle shop, Nobita finds that the new angle of elevation of the tower is 60^o. Find the height of the tower and the distance of the noodle shop from the base of the tower.
2. Find the measures of the interior angles of a triangle with dimensions 6 by 10 by 14. (*To simplify your solution, first find the angle opposite the longest side.*)

END OF EXAM