Math 49B (8:30am – 9:20am)
Quiz 4 Version B
Fri Feb 4, 2011

What month is your birthday ? ___ ___
What are the first 2 digits of your address ? ___ ___
What are the last 2 digits of your zip code ? ___ ___
What are the last 2 digits of your DeAnza ID number ? ___ ___

SCORE: ___ / 30 POINTS

NO CALCULATORS ALLOWED

YOU MUST SHOW APPROPRIATE WORK TO RECEIVE FULL CREDIT

Give polar co-ordinates for the point with rectangular co-ordinates $(-1, \sqrt{3})$. **SCORE: ___ / 3 POINTS**

SUBTRACT ½ POINT IF YOU DIDN'T USE (,) NOTATION

$r = \sqrt{(-1)^2 + (\sqrt{3})^2} = 2$

$\theta = \pi + \arctan(-\sqrt{3}) = \pi + \frac{-\pi}{3} = \frac{2\pi}{3}$ (1)

$(r, \theta) = \left(2, \frac{2\pi}{3}\right)$ (1) (1)

Use DeMoivre's Theorem to find $(-1 + i\sqrt{3})^5$. **SCORE: ___ / 5 POINTS**

Use trigonometric form for all work, but write your final answer in standard form.

USING WORK FROM QUESTION ABOVE $-1 + i\sqrt{3} = 2\,\text{cis}\,\frac{2\pi}{3}$ (1)

$(2\,\text{cis}\,\frac{2\pi}{3})^5 = 2^5\,\text{cis}\,5\left(\frac{2\pi}{3}\right) = 32\,\text{cis}\,\frac{10\pi}{3}$ (1) (1)

$= 32\left[\cos\frac{10\pi}{3} + i\sin\frac{10\pi}{3}\right]$

$= 32\left[-\frac{1}{2} - \frac{\sqrt{3}}{2}i\right] = -16 - 16\sqrt{3}\,i$ (1) (1)

A point has polar co-ordinates $\left(8, \frac{5\pi}{3}\right)$. **SCORE: ___ / 4 POINTS**

[a] Find a polar representation of the point using a positive r – value and a negative θ – value.

$\left(8, \frac{5\pi}{3} - 2\pi\right) = \left(8, -\frac{\pi}{3}\right)$ (1) (1)

[b] Find a polar representation of the point using a negative r – value and a positive θ – value.

$\left(-8, \frac{5\pi}{3} - \pi\right) = \left(-8, \frac{2\pi}{3}\right)$ (1) (1)

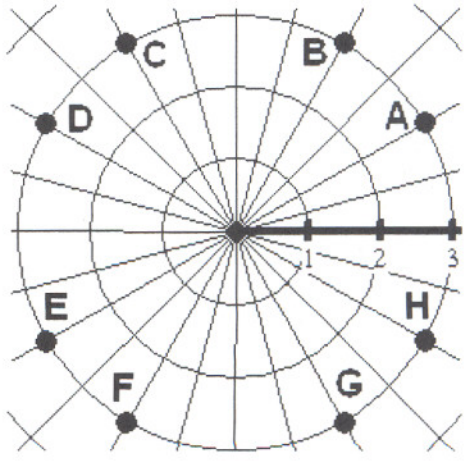
[c] Find the rectangular co-ordinates of the point.

$\left(8\cos\frac{5\pi}{3}, 8\sin\frac{5\pi}{3}\right) = \left(8\left(\frac{1}{2}\right), 8\left(-\frac{\sqrt{3}}{2}\right)\right) = (4, -4\sqrt{3})$ (1) (1)

Fill in the blanks using the graph on the right. **SCORE: ___ / 2 POINTS**

[a] The polar co-ordinates $\left(-3, \frac{5\pi}{6}\right)$ refers to point H. (1) (1)

[b] The polar co-ordinates $\left(-3, -\frac{2\pi}{3}\right)$ refers to point B. (1) (1)



Find $\dfrac{18(\cos 84^\circ + i\sin 84^\circ)}{3(\cos 31^\circ + i\sin 31^\circ)}$. **Write your final answer in trigonometric form.** **SCORE: ___ / 2 POINTS**

$\frac{18}{3}\,\text{cis}(84^\circ - 31^\circ) = 6\,\text{cis}\,53^\circ$ (1, 1)

If $x > 0$, write $\cos(2\cos^{-1} x)$ as an algebraic expression (ie. an expression without trigonometric functions). **SCORE: ___ / 3 POINTS**

LET $\theta = \cos^{-1} x$

$\cos\theta = x$

$\cos(2\cos^{-1} x) = \cos 2\theta = 2\cos^2\theta - 1 = 2x^2 - 1$ (3)

Convert the polar equation $r = 1 - 2\cos\theta$ to rectangular form. **SCORE: ___ / 5 POINTS**

Simplify your answer so that it has no fractions, radicals or negative/fractional exponents.

$r = 1 - 2\left(\frac{x}{r}\right)$ ($\frac{1}{2}$)

$r^2 = r - 2x$ ($\frac{1}{2}$)

$x^2 + y^2 = \sqrt{x^2+y^2} - 2x$ (3)

$x^2 + y^2 + 2x = \sqrt{x^2+y^2}$

$(x^2+y^2+2x)^2 = x^2 + y^2$ (1)

OR

$r^2 = r - 2r\cos\theta$ (1)

$x^2 + y^2 = \sqrt{x^2+y^2} - 2x$ (3)

$x^2 + y^2 + 2x = \sqrt{x^2+y^2}$

$(x^2+y^2+2x)^2 = x^2 + y^2$ (1)

Test $r = 1 - \cos\theta$ for symmetry with respect to the pole. **SCORE: ___ / 6 POINTS**

State clearly what the results of your test tell you about the symmetry of this particular graph.

($1\frac{1}{2}$) $r = 1 - \cos(\pi + \theta)$

$r = 1 - [\cos\pi\cos\theta - \sin\pi\sin\theta]$

(1) $r = 1 + \cos\theta$ NO CONCLUSION/DON'T KNOW

($1\frac{1}{2}$) $-r = 1 - \cos\theta$

(1) $r = -1 + \cos\theta$ NO CONCLUSION/DON'T KNOW

THE TEST DOESN'T TELL US IF THE GRAPH IS SYMMETRIC OR NOT - THERE IS NO CONCLUSION (1)