Math 49B (8:30am – 9:20am)
Quiz 4 Version D
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 $\frac{1}{2}$ 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)

$(r, \theta) = (2, \frac{2\pi}{3})$ (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 $-1 + i\sqrt{3} = 2 \operatorname{cis} \frac{2\pi}{3}$ (1)

$(2 \operatorname{cis} \frac{2\pi}{3})^5 = 2^5 \operatorname{cis} 5(\frac{2\pi}{3}) = 32 \operatorname{cis} \frac{10\pi}{3}$ (1) (1)

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

$= 32 [-\frac{1}{2} - \frac{\sqrt{3}}{2} i] = -16 - 16\sqrt{3} i$ (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.

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

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

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

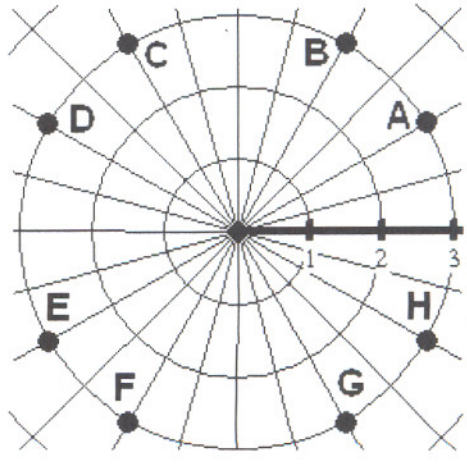
[c] Find the rectangular co-ordinates of the point.

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

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

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

[b] The polar co-ordinates $\left(-3, -\frac{5\pi}{3}\right)$ refers to point F. (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**

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

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

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

$\cos\theta = x$

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

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

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