Math 49B (8:30am – 9:20am)
Quiz 4 Version A
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 $(-\sqrt{3}, 1)$. **SCORE: ___ / 3 POINTS**

SUBTRACT $\frac{1}{2}$ POINT IF YOU DIDN'T USE (,) NOTATION

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

$\theta = \pi + \arctan\left(\frac{1}{-\sqrt{3}}\right) = \pi + \frac{-\pi}{6} = \frac{5\pi}{6}$

$(r, \theta) = \left(2, \frac{5\pi}{6}\right)$

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

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

USING WORK FROM QUESTION ABOVE $-\sqrt{3} + i = 2\,\text{cis}\,\frac{5\pi}{6}$

$\left(2\,\text{cis}\,\frac{5\pi}{6}\right)^5 = 2^5\,\text{cis}\,5\left(\frac{5\pi}{6}\right) = 32\,\text{cis}\,\frac{25\pi}{6}$

$= 32\left[\cos\frac{25\pi}{6} + i\sin\frac{25\pi}{6}\right]$

$= 32\left[\frac{\sqrt{3}}{2} + \frac{1}{2}i\right] = 16\sqrt{3} + 16i$

A point has polar co-ordinates $\left(8, \frac{7\pi}{6}\right)$. **SCORE: ___ / 4 POINTS**

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

$\left(8, \frac{7\pi}{6} - 2\pi\right) = \left(8, -\frac{5\pi}{6}\right)$

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

$\left(-8, \frac{7\pi}{6} - \pi\right) = \left(-8, \frac{\pi}{6}\right)$

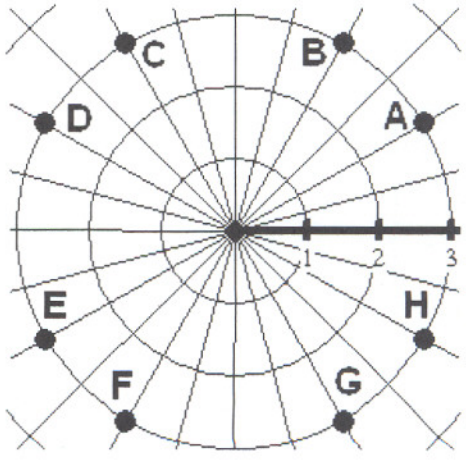
[c] Find the rectangular co-ordinates of the point.

$\left(8\cos\frac{7\pi}{6}, 8\sin\frac{7\pi}{6}\right) = \left(8\left(-\frac{\sqrt{3}}{2}\right), 8\left(-\frac{1}{2}\right)\right) = \left(-4\sqrt{3}, -4\right)$

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 D.

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



Find $\dfrac{24(\cos 97^\circ + i\sin 97^\circ)}{8(\cos 62^\circ + i\sin 62^\circ)}$. **Write your final answer in trigonometric form.** **SCORE: ___ / 2 POINTS**

$\frac{24}{8}\,\mathrm{cis}(97^\circ - 62^\circ) = 3\,\mathrm{cis}\,35^\circ$ (1 + 1)

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

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

$\tan\theta = x$

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

Convert the polar equation $r = 1 - 3\sin\theta$ to rectangular form. **SCORE: ___ / 5 POINTS**

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

$r = 1 - 3\left(\frac{y}{r}\right)$ (½)

$r^2 = r - 3y$ (½)

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

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

$(x^2+y^2+3y)^2 = x^2+y^2$ (1)

OR

$r^2 = r - 3r\sin\theta$ (1)

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

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

$(x^2+y^2+3y)^2 = x^2+y^2$ (1)

Test $r = 1 - \cos\theta$ for symmetry with respect to $\theta = \dfrac{\pi}{2}$. **SCORE: ___ / 6 POINTS**

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

$r = 1 - \cos(\pi - \theta)$ (1½)

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

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

$-r = 1 - \cos(-\theta)$ (1½)

$-r = 1 - \cos\theta$

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

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