**Math 49B (8:30am – 9:20am)**
**Quiz 4 Version C**
**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 ½ POINT IF YOU DIDN'T USE ( , ) NOTATION

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

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

$(r, \theta) = (\underbrace{2}_{1}, \underbrace{\frac{5\pi}{6}}_{1})$

Use DeMoivre's Theorem to find $(-\sqrt{3} + i)^5$. **SCORE: ___ / 5 POINTS**
<u>**Use trigonometric form for all work, but write your final answer in standard form.**</u>

USING WORK FROM QUESTION ABOVE $-\sqrt{3} + i = \underline{2 \text{cis} \frac{5\pi}{6}}$ 1

$(2 \text{cis} \frac{5\pi}{6})^5 = 2^5 \text{cis}\, 5\left(\frac{5\pi}{6}\right) = \underbrace{32}_{1} \underbrace{\text{cis} \frac{25\pi}{6}}_{1}$

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

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

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 $\theta$ – value.

$\left(8, \frac{7\pi}{6} - 2\pi\right) = \underline{\left(8, -\frac{5\pi}{6}\right)}$ 1

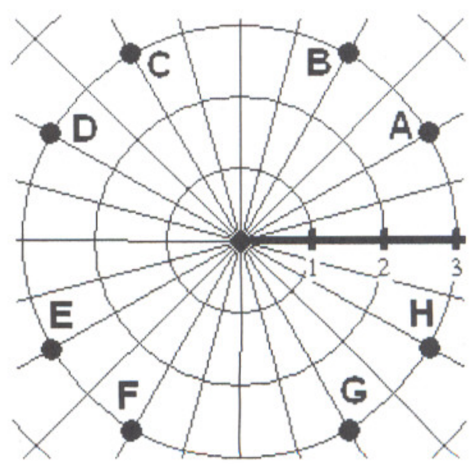
[b] Find a polar representation of the point using a negative $r$ – value and a positive $\theta$ – value.

$\left(-8, \frac{7\pi}{6} - \pi\right) = \underline{\left(-8, \frac{\pi}{6}\right)}$ 1

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

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

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 <u>A</u>. 1

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

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

$\frac{24}{8}\operatorname{cis}(97^\circ - 62^\circ) = \underbrace{3}_{1}\underbrace{\operatorname{cis} 35^\circ}_{1}$

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

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

$\tan\theta = x$

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

Convert the polar equation $r = 1 - 3\sin\theta$ to rectangular form.

**Simplify your answer so that it has no fractions, radicals or negative/fractional exponents.** SCORE: ___ / 5 POINTS

$r = 1 - 3\left(\frac{y}{r}\right)$, $\frac{1}{2}$

$r^2 = r - 3y$, $\frac{1}{2}$

$x^2+y^2 = \sqrt{x^2+y^2} - 3y$, 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 $\theta = \frac{\pi}{2}$. 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

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

$-r = 1 - \cos\theta$

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

THE TEST DOES NOT TELL US IF THE GRAPH IS SYMMETRIC OR NOT - THERE IS NO CONCLUSION 1