Math 49B
Quiz 4
Fri Feb 8, 2008

Code: ________________________
I forgot my code, so please charge me two points: (Name) ______________

[4 POINTS] Perform the following operations and leave the results in trigonometric form.

(a) $$\frac{15\left(\cos\frac{2\pi}{3}+i\sin\frac{2\pi}{3}\right)}{5\left(\cos\frac{\pi}{4}+i\sin\frac{\pi}{4}\right)}$$

(b) $$\left[4(\cos 40^\circ + i\sin 40^\circ)\right]\left[3(\cos 60^\circ + i\sin 60^\circ)\right]$$

$\frac{15}{5}\operatorname{cis}\left(\frac{2\pi}{3}-\frac{\pi}{4}\right)$

$= 3\operatorname{cis}\left(\frac{5\pi}{12}\right)$

$(4\cdot 3)\operatorname{cis}(40^\circ+60^\circ)$

$= 12\operatorname{cis}(100^\circ)$

1 POINT EACH

OK TO USE $\cos \_ + i\sin \_$ ↓

$-\frac{1}{2}$ POINT IF YOU FORGOT cis (EACH)

$-\frac{1}{2}$ POINT IF YOU FORGOT ° IN (b)

[4 POINTS] Convert the polar equation $r = 5\cos\theta$ to rectangular form and simplify.

$r = \frac{5x}{r}$ 1

1 $r^2 = 5x$ 1

1 $x^2+y^2 = 5x$

OR

$r^2 = 5r\cos\theta$

$x^2+y^2 = 5x$

1 POINT EACH

[4 POINTS] Convert the rectangular equation $xy = 4$ to polar form and simplify.

$\frac{1}{2}$ $(r\cos\theta)(r\sin\theta) = 4$ $\frac{1}{2}$

1 $r^2\cos\theta\sin\theta = 4$

$2r^2\cos\theta\sin\theta = 8$

$r^2\sin 2\theta = 8$

$r^2 = 8\csc 2\theta$ 1

$\frac{1}{2}$ $\frac{1}{2}$

OR →

$\frac{1}{2}$ $r^2 = \frac{4}{\cos\theta\sin\theta}$ $\frac{1}{2}$

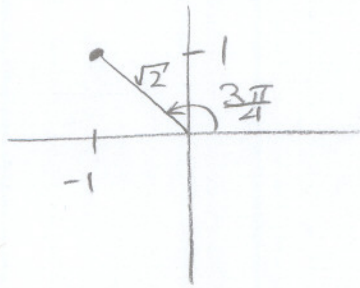
$r^2 = 4\sec\theta\csc\theta$

$\frac{1}{2}$

[QUESTIONS ON OTHER SIDE]

[3 POINTS] Consider the point with rectangular coordinates $(-1, 1)$.

(a) Convert the point to polar coordinates.



$$\left(\sqrt{2}, \frac{3\pi}{4}\right)$$

1 POINT EACH

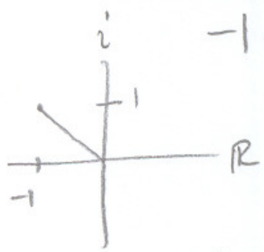
$-\frac{1}{2}$ POINT IF NOT IN CO-ORDINATE FORM IE. (r, θ)

(b) Find a polar representation of the point using the opposite of the r-value you used in part (a).

$$\left(-\sqrt{2}, -\frac{\pi}{4}\right) \text{ OR } \left(-\sqrt{2}, \frac{7\pi}{4}\right)$$

$\frac{1}{2}$ POINT EACH

[5 POINTS] Use DeMoivre's Theorem to find the value of $(-1+i)^8$. Write the answer in standard form.



$$-1 + i = \sqrt{2} \operatorname{cis} \frac{3\pi}{4}$$

(WORK SAME AS QUESTION ABOVE)

$$(-1+i)^8 = \sqrt{2}^8 \operatorname{cis}\left(8 \cdot \frac{3\pi}{4}\right)$$

$$= 2^4 \operatorname{cis} 6\pi$$

$$= 16(\cos 6\pi + i \sin 6\pi)$$

$$= 16(1 + 0i)$$

$$= 16$$

OK TO USE $\cos \_ + i \sin \_$

$-\frac{1}{2}$ POINT IF YOU FORGOT cis