Problem set 1 (has key)

Multiplying & Dividing Complex Numbers

$z_1 = 7 - 2i$ $\quad z_2 = -1 + i\sqrt{3}$ $\quad z_3 = 4\left(\cos\frac{\pi}{4} + i\sin\frac{\pi}{4}\right)$

$z_4 = 3\left(\cos\frac{5\pi}{6} + i\sin\frac{5\pi}{6}\right)$ $\quad z_5 = \left[\cos\left(-\frac{\pi}{2}\right) + i\sin\left(-\frac{\pi}{2}\right)\right]$ $\quad z_6 = -7 + 7i$

Given the complex numbers above, complete the following problems. Be sure to give exact values when possible. Use trig identities when needed.

1. Give the trig form of z_1 (calculator based)

2. Give the standard form of z_4

3. Find $\frac{z_6}{z_3}$. Give your answer in trig form.

4. Find $z_2 z_4$. Give your answer in standard form.

6. Find $z_5 z_6$. Give your answer in trig form.

7. Find $|z_2|$

Problem set 2 (no key)

Dot Product, Orthogonal Vectors

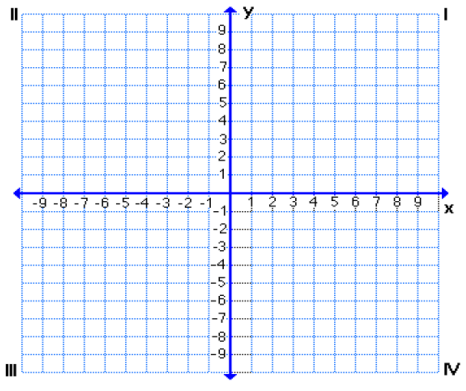
Draw vectors $\boldsymbol{u}$ and $\boldsymbol{v}$ on the same coordinate plane. Then, find the dot product of $\boldsymbol{u}$ and $\boldsymbol{v}$, $\|\boldsymbol{u}\|$ and $\|\boldsymbol{v}\|$. Finally, find the measure of the angle between the two vectors.

2. $\boldsymbol{u} = \langle 2,\ 4\rangle$ and $\boldsymbol{v} = \langle -2,\ 6\rangle$

$\boldsymbol{u} \cdot \boldsymbol{v} =$

$\|\boldsymbol{u}\| =$

$\|\boldsymbol{v}\| =$



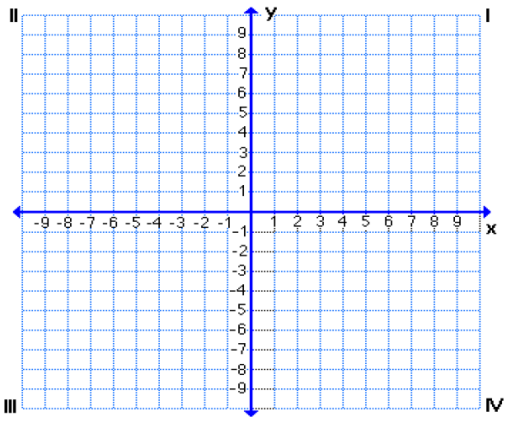
Angle between the two vectors = _____

3. $\boldsymbol{u} = \langle 4, -2 \rangle$ and $\boldsymbol{v} = \langle 3, 6 \rangle$

$\boldsymbol{u} \cdot \boldsymbol{v} =$

$\|\boldsymbol{u}\| =$

$\|\boldsymbol{v}\| =$



Angle between the two vectors = _____

Problem set 3 (has key)

find

the trigonometric form of the number

1. $3 - 3i$ **2.** $\sqrt{3} + i$ **3.** $-5i$ **4.** 4

Find the standard form of the number

1. $\frac{1}{4}(\cos 300° + i \sin 300°)$

Perform the operation and leave in trigonometric form

1. $\left[2\left(\cos\frac{\pi}{4} + i \sin\frac{\pi}{4}\right)\right]\left[6\left(\cos\frac{\pi}{12} + i \sin\frac{\pi}{12}\right)\right]$

2. $\frac{5(\cos 4.3 + i \sin 4.3)}{4(\cos 2.1 + i \sin 2.1)}$

3. $\frac{12(\cos 52° + i \sin 52°)}{3(\cos 110° + i \sin 110°)}$

Use DeMoivre's Theorem to find the indicated power of the complex number. Write in standard form.

1. $(1 + i)^5$ **2.** $\left(\sqrt{3} + i\right)^7$

Problem set 4, (same key as problem set 3)

Find the component form of **v** given its magnitude and the angle it makes with the positive x-axis.

1. $\|v\| = 2\sqrt{3}\,, \theta = 90°$

2. $\|v\| = 8\,, \theta = 225°$

Find the magnitude and direction angle of the vector **v**.

3. $\mathbf{v} = -4i + 7j$

4. $\mathbf{v} = -3\,i - 3j$

5. $\mathbf{v} = 8i - j$

#3-5 are calculator based

Find the dot product of **u** and **v**.

6. $u = \langle 4, -3\rangle\,, v = \langle 1, 5\rangle$

7. $u = -3i + j,\ v = -2i - 6j$

Find the angle θ between the vectors. Round to the nearest tenth of a degree.

8. $u = \langle 1, -4\rangle\,, v = \langle 2, 2\rangle$

9. $u = 3i + 7j,\ v = -i + 2j$

#8 and 9 are calculator based

Represent the complex number graphically, and find the trigonometric form of the number.

13. $2 - 2i$

14. $-3i$

15. 6

Perform the operation and leave the result in trigonometric form.

16. Find $z_1 z_2$ $\quad z_1 = 3\left(\cos\frac{\pi}{6} + \sin\frac{\pi}{6}i\right)$ $\quad z_2 = 4\left(\cos\frac{\pi}{12} + \sin\frac{\pi}{12}i\right)$

17. Find $\frac{z_1}{z_2}$ $\quad z_1 = (cos2.5 + sin2.5\,i)$ $\quad z_2 = 6(cos1.5 + i\,sin1.5\,)$

Use DeMoivre's Theorem to find the indicated power of the complex number. Write the result in standard form.

18. $(1 - i)^6$

19. $[2(cos15° + i\,sin15°)]^4$