GO COUGARS!

## p 467 Homework Questions

In Exercises 1–8, find the dot product of **u** and **v**.

5. $\mathbf{u} = 4\mathbf{i} - 2\mathbf{j}$
   $\mathbf{v} = \mathbf{i} - \mathbf{j}$
7. $\mathbf{u} = 3\mathbf{i} + 2\mathbf{j}$
   $\mathbf{v} = -2\mathbf{i} - 3\mathbf{j}$

In Exercises 9–18, use the vectors $\mathbf{u} = \langle 2, 2\rangle$, $\mathbf{v} = \langle -3, 4\rangle$, and $\mathbf{w} = \langle 1, -2\rangle$ to find the indicated quantity. State whether the result is a vector or a scalar.

9. $\mathbf{u} \cdot \mathbf{u}$
11. $(\mathbf{u} \cdot \mathbf{v})\mathbf{v}$
13. $(3\mathbf{w} \cdot \mathbf{v})\mathbf{u}$
17. $(\mathbf{u} \cdot \mathbf{v}) - (\mathbf{u} \cdot \mathbf{w})$

In Exercises 25–34, find the angle $\theta$ between the vectors.

25. $\mathbf{u} = \langle 1, 0\rangle$
    $\mathbf{v} = \langle 0, -2\rangle$
27. $\mathbf{u} = 3\mathbf{i} + 4\mathbf{j}$
    $\mathbf{v} = -2\mathbf{j}$
31. $\mathbf{u} = 5\mathbf{i} + 5\mathbf{j}$
    $\mathbf{v} = -6\mathbf{i} + 6\mathbf{j}$
33. $\mathbf{u} = \cos\left(\frac{\pi}{3}\right)\mathbf{i} + \sin\left(\frac{\pi}{3}\right)\mathbf{j}$
    $\mathbf{v} = \cos\left(\frac{3\pi}{4}\right)\mathbf{i} + \sin\left(\frac{3\pi}{4}\right)\mathbf{j}$

$u = \frac{1}{2}i + \frac{\sqrt{3}}{2}j = \langle \frac{1}{2}, \frac{\sqrt{3}}{2} \rangle$

$v = -\frac{1}{\sqrt{2}}i + \frac{1}{\sqrt{2}}j = \langle -\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}} \rangle$

$\cos\theta = \frac{u \cdot v}{\|u\| \|v\|}$

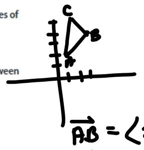
$= -\frac{1}{2\sqrt{2}} + \frac{\sqrt{3}}{2\sqrt{2}}$

$\|u\| = 1 \quad \|v\| = 1$

$\cos\theta = \frac{\sqrt{3}-1}{2\sqrt{2}}$

In Exercises 39–42, use vectors to find the interior angles of the triangle with the given vertices.

39. (1, 2), (3, 4), (2, 5)




$\overrightarrow{AB} = \langle 2, 2 \rangle$

$\overrightarrow{BC} = \langle -1, 1 \rangle$

$\cos\theta = \frac{u \cdot v}{\|u\| \|v\|}$

$\theta = 90$

In Exercises 43–46, find $\mathbf{u} \cdot \mathbf{v}$, where $\theta$ is the angle between **u** and **v**.

43. $\|\mathbf{u}\| = 4$, $\|\mathbf{v}\| = 10$, $\theta = \frac{2\pi}{3}$
45. $\|\mathbf{u}\| = 9$, $\|\mathbf{v}\| = 36$, $\theta = \frac{3\pi}{4}$

$\cos\left(\frac{3\pi}{4}\right) = \frac{u \cdot v}{9 \cdot 36}$

$-\frac{1}{\sqrt{2}} = \frac{u \cdot v}{324}$

$-\frac{1}{\sqrt{2}}(324) = u \cdot v$

$-\frac{324}{\sqrt{2}} = u \cdot v$

In Exercises 47–52, determine whether **u** and **v** are orthogonal, parallel, or neither.

47. $\mathbf{u} = \langle -12, 30\rangle$
    $\mathbf{v} = \langle \frac{1}{2}, -\frac{5}{4}\rangle$
49. $\mathbf{u} = \frac{1}{4}(3\mathbf{i} - \mathbf{j})$
    $\mathbf{v} = 5\mathbf{i} + 6\mathbf{j}$
51. $\mathbf{u} = 2\mathbf{i} - 2\mathbf{j}$
    $\mathbf{v} = -\mathbf{i} - \mathbf{j}$

$-\frac{5}{\cancel{4}_2} \cdot \cancel{30}^{15}$

$-\frac{75}{2}$

$-6 + \left(-\frac{75}{2}\right)$

Feb 2-9:51 PM

# Section 6.5 - Trigonometric Forms of a Complex Number

Graphing

Absolute Value

Standard vs. Trigonometric Form

Multiplying and Dividing

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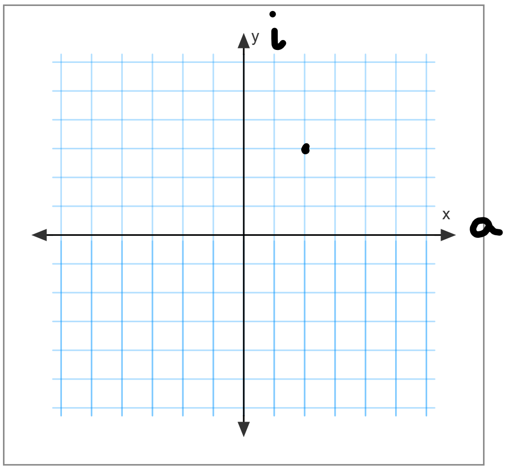
# To graph an imaginary number




$2+3i$

r = absolute value

= magnitude

= modulus

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# Absolute Value of a Complex Number

$z = a + bi$

$|a+bi| = \sqrt{a^2+b^2}$

Ex. $|2+3i| = \sqrt{2^2+3^2}$

$= \sqrt{13}$

Mar 31-12:20 PM

# Trig form of a Complex Number

$a = r\cos\theta$ $b = r\sin\theta$ $\theta =$ argument

$z = (r\cos\theta) + (r\sin\theta)i$ remember: $r = \sqrt{a^2 + b^2}$

Ex. Find the trig form of the complex number

Q4 $z = 6 - 6i$

find r $= \sqrt{6^2 + (-6)^2}$

$= 6\sqrt{2}$

find $\theta$ $\tan\theta = \frac{-6}{6}$

$\tan\theta = -1$

$\theta = 315$

$z = 6\sqrt{2}\cos 315 + i6\sqrt{2}\sin 315$

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# Write in standard form

$\underbrace{\phantom{xx}}$ a+bi

$8(\cos\frac{2\pi}{3} + i\sin\frac{2\pi}{3})$

$8\cos\frac{2\pi}{3} + 8i\sin\frac{2\pi}{3}$

$8(-\frac{1}{2}) + i8(\frac{\sqrt{3}}{2})$

$-4 + 4\sqrt{3}i$

Mar 31-12:28 PM

# Multiplication and Division of Complex Numbers

$z_1 = r_1(\cos\theta_1 + i\sin\theta_1)$ $z_2 = r_2(\cos\theta_2 + i\sin\theta_2)$

$z_1 z_2 = r_1 r_2 \left(\cos\theta_1\cos\theta_2 + \cos\theta_1 i\sin\theta_2 + i\sin\theta_1\cos\theta_2 - \sin\theta_1\sin\theta_2\right.$

$r_1 r_2\left[\left(\cos\theta_1\cos\theta_2 - \sin\theta_1\sin\theta_2\right) + \left(\cos\theta_1\sin\theta_2 + \sin\theta_1\cos\theta_2\right)i\right]$

$r_1 r_2\left(\cos(\theta_1+\theta_2) + i\sin(\theta_1+\theta_2)\right)$

$\frac{z_1}{z_2} = \frac{r_1}{r_2}\left(\cos(\theta_1-\theta_2) + i\sin(\theta_1-\theta_2)\right)$

Mar 31-12:33 PM

Ex. $z_1 = 3(\cos\frac{\pi}{3} + i\sin\frac{\pi}{3})$ $z_2 = 4(\cos\frac{\pi}{6} + i\sin\frac{\pi}{6})$

$z_1 z_2 = 3\cdot 4\left[\cos\left(\frac{\pi}{3}+\frac{\pi}{6}\right) + i\sin\left(\frac{\pi}{3}+\frac{\pi}{6}\right)\right]$

$= 12\left(\cos\frac{\pi}{2} + i\sin\frac{\pi}{2}\right)$

$= 12(0 + 1i)$

$= 12i$

Apr 1-1:05 PM

Ex. $z_1 = \cos 40° + i \sin 40°$ $z_2 = \cos 10° + i \sin 10°$

$$\frac{z_1}{z_2} = \frac{\sqrt{3}}{2} + \frac{1}{2}i$$

Apr 1-1:05 PM

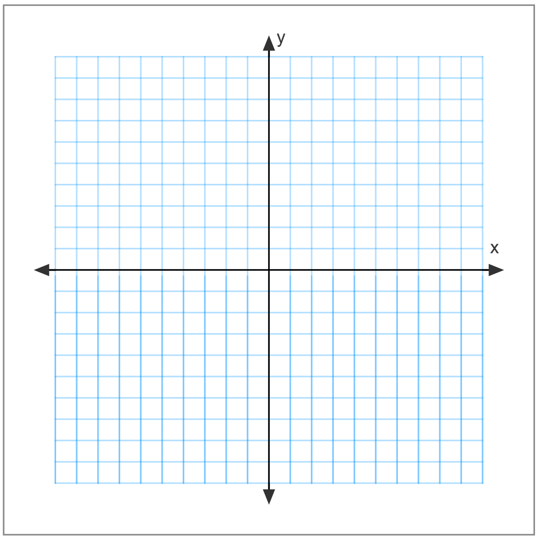
# HOMEWORK

p 478 5, 11-19 odd, 31, 37, 39, 47, 49, 53, 57, 59, 63, 65

Aug 29-6:38 AM

# Graph with trig form:

$3(\cos\pi + i\sin\pi)$

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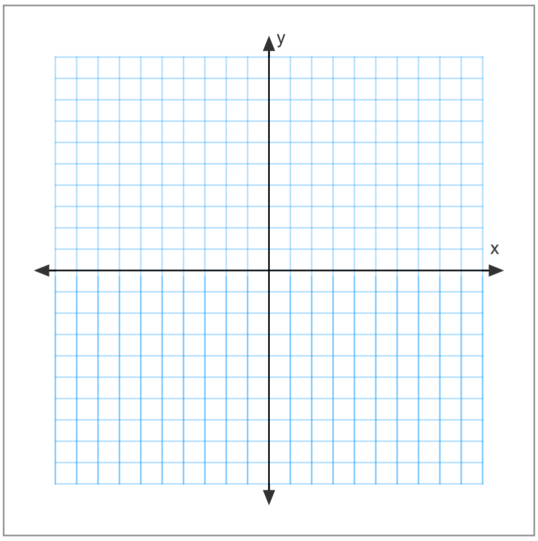
# Graph with trig form:

$4(\cos\frac{-7\pi}{4} + i\sin\frac{-7\pi}{4})$

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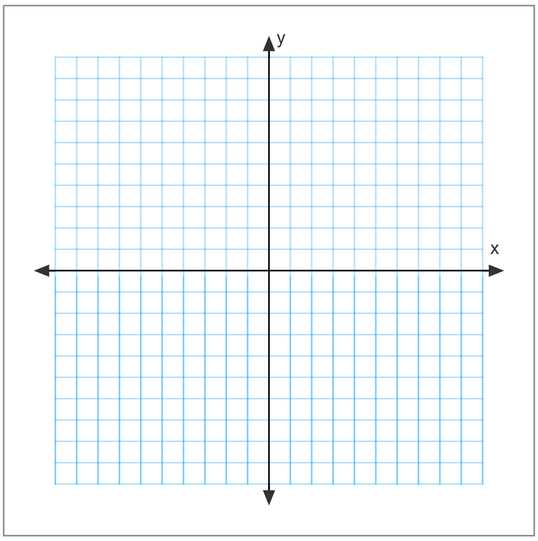
# Graph with trig form:

$5(\cos 135° + i\sin 135°)$

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# Find $2(\cos 30° + i\sin 30°) \bullet 6(\cos 60° + i\sin 60°)$

Mar 31-12:38 PM