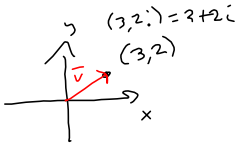
LarTrig9 4.3.001. (2456600) (Add) -- view
Comment: not randomized

Fill in the blanks.

In the complex plane, the horizontal axis is called the [---Select---] real axis and the vertical axis is called the [---Select---] imaginary axis.



$\bar{v} = 3\bar{i} + 2\bar{j}$

LarTrig9 4.3.002. (2446695) (Add) -- view

Fill in the blank.

The [---Select---] absolute value of a complex number $a + bi$ is the distance between the origin (0, 0) and the point (a, b).

magnitude, modulus

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

$z = a + bi$

LarTrig9 4.3.003. (2548172) (Add) -- view
Comment: not randomized

Fill in the blanks.

The [---Select---] trigonometric form of a complex number $z = a + bi$ is given by $z = r(\cos\theta + i\sin\theta)$, where r is the [---Select---] modulus of z and θ is the

$a+bi = r(\cos\theta + i\sin\theta)$

LarTrig9 4.3.004. (2456463) (Add) -- view
Comment: not randomized, slightly modified

Fill in the blanks.

Let $z_1 = r_1(\cos\theta_1 + i\sin\theta_1)$ and $z_2 = r_2(\cos\theta_2 + i\sin\theta_2)$ be complex numbers, then the product z_1z_2 =

$r_1r_2(\cos(\theta_1+\theta_2) + i\sin(\theta_1+\theta_2))$

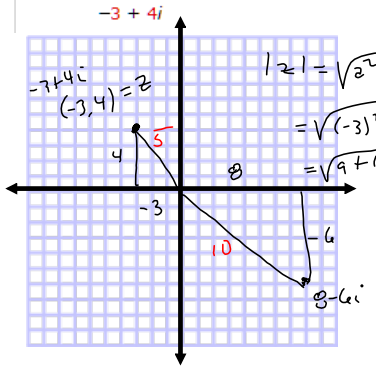
multiply moduli, add arguments

The quotient z_1/z_2 = _____, $(z_2 \neq 0)$.

LarTrig9 4.3.005. (2446153) (Add) -- view

Plot the complex number and find its absolute value.

$-3 + 4i$



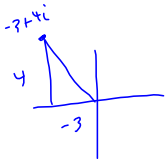
$|z| = \sqrt{a^2+b^2} = \sqrt{(-3)^2 + (4)^2} = \sqrt{9+16} = \sqrt{25} = 5 = |z|$

$|z| = \sqrt{8^2 + (-6)^2} = \sqrt{64+36} = \sqrt{100} = 10 = |z|$

LarTrig9 4.3.006. (2446906) (Add) -- view

Plot the complex number and find its absolute value.

$8 - 6i$

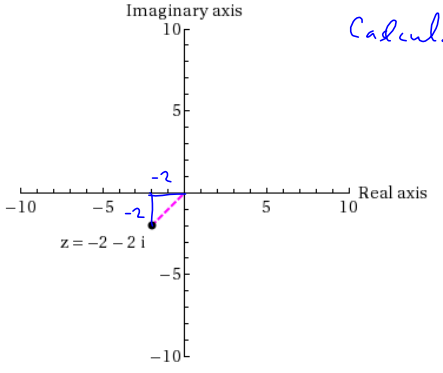


LarTrig9 4.3.013. (2537352) (Add) -- view

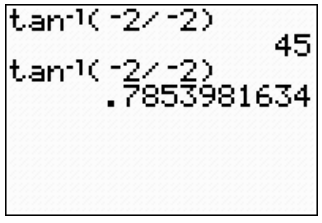
Write the complex number in trigonometric form. (Enter your angle measures in radians.)

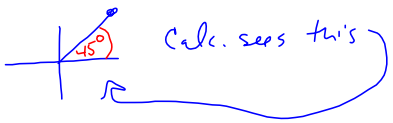
$z =$ $2\sqrt{2}\left(\cos\left(\frac{5\pi}{4}\right) + i\sin\left(\frac{5\pi}{4}\right)\right)$

$2\sqrt{2}(\cos(\frac{5\pi}{4}) + i\sin(\frac{5\pi}{4}))$

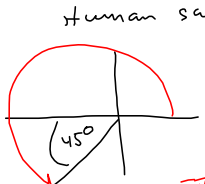


Calculator says 45°





human says



225° or $\frac{5\pi}{4}$ radians

$\approx .7853981634$ rad.

$|z| = \sqrt{2^2+2^2} = \sqrt{8} = 2\sqrt{2}$

Nov 10-8:35 AM

LarTrig9 4.3.017. (2446824) (Remove) -- view

Represent the complex number graphically.

$1 - \sqrt{3}i$


```
          -1.047197551
π/4
          .7853981634
tan-1(-√(3))
          -1.047197551
π/3
          1.047197551
```

$\theta' = \arctan\left(\frac{-\sqrt{3}}{1}\right) = -\frac{\pi}{3} \approx -1.047197551 \text{ rad}$

Write the trigonometric form of the number. (Let $0 \le \theta < 2\pi$.)

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

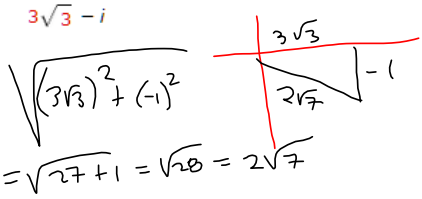
$2\left(\cos\left(\frac{5\pi}{3}\right) + i\sin\left(\frac{5\pi}{3}\right)\right)$

$2\pi - \frac{\pi}{3} = \frac{6\pi - \pi}{3} = \frac{5\pi}{3}$ rad $= 300^\circ$

LarTrig9 4.3.028. (2446460) (Add) -- view

Represent the complex number graphically.

$3\sqrt{3} - i$

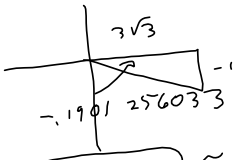


$\sqrt{(3\sqrt{3})^2 + (-1)^2}$

$= \sqrt{27 + 1} = \sqrt{28} = 2\sqrt{7}$

$2\sqrt{7}(\cos 6.09 + i \sin 6.09)$

```
tan-1(-√(3))
          -1.047197551
π/3
          1.047197551
tan-1(-1/(3√(3)))
          -.1901256033
```



$2\pi - .1901\ldots \approx$

```
π/3
          1.047197551
tan-1(-1/(3√(3)))
          -.1901256033
2π+Ans
          6.093059704
```

$\notin [0, 2\pi)$

Interpret!

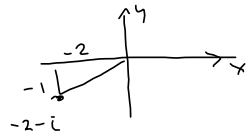
Write the trigonometric form of the number. (Round your angles to two decimal places. Let $0 \le \theta < 2\pi$.)

$2\sqrt{7}(\cos 6.09 + i \sin 6.09)$

LarTrig9 4.3.029. (2456130) (Add) -- view

Represent the complex number graphically.

$-2 - i$



Write the trigonometric form of the number. (Round your angles to two decimal places. Let $0 \le \theta < 2\pi$.)

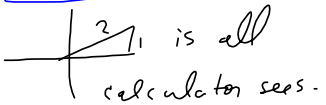
$\sqrt{5}(\cos(3.61) + i\sin(3.61))$

$\sqrt{1^2+2^2} = \sqrt{5} = r$

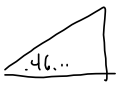
$\theta' = \arctan\left(\frac{-1}{-2}\right)$

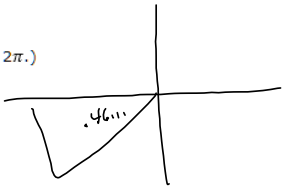
$= \arctan\left(\frac{1}{2}\right)$

$\sqrt{5}(\cos(3.61) + i\sin(3.61))$



is all calculator sees.






```
tan⁻¹(.5)
          .463647609
π+Ans
          3.605240263
```

$\approx \theta$

$\approx \theta$

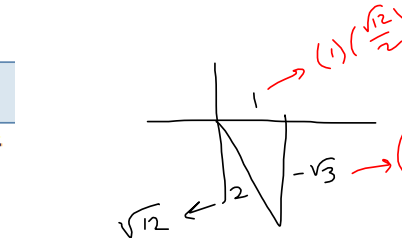
#11

LarTrig9 4.3.037. (2446090) (Add) -- view

Write the standard form of the complex number.

$\sqrt{12}[\cos(-60°) + i\sin(-60°)]$

$\sqrt{3} - 3i$



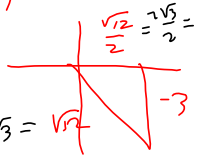
$(1)\left(\frac{\sqrt{12}}{2}\right)$

$\left(-\sqrt{3}\right)\left(\frac{\sqrt{12}}{2}\right) = -\frac{6}{2} = -3$

$\sqrt{36} = 6$

$2\sqrt{3} = \sqrt{12}$

$\frac{\sqrt{12}}{2} = \frac{2\sqrt{3}}{2} = \sqrt{3}$



$2\sqrt{3} = \sqrt{12}$

$\sqrt{12} = 2x$

$\frac{\sqrt{12}}{2} = x$

$a+bi$

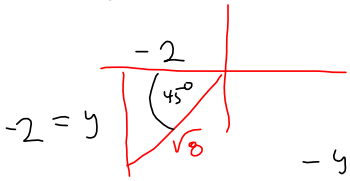
$= \sqrt{3} - 3i$

#12

LarTrig9 4.3.038. (2456313) (Add) -- view

Write the standard form of the complex number.

$\sqrt{8}(\cos 225° + i \sin 225°)$



$-2 = y$

$x = \sqrt{8}\cos 225^\circ$

or $-\sqrt{8}\cos 45^\circ = -2\sqrt{2}\left(\frac{1}{\sqrt{2}}\right) = -2$

$-y = \sqrt{8}\sin 45^\circ$

$= 2\sqrt{2}\cdot\frac{1}{\sqrt{2}} = 2$

$y = -2$

$-2-2i$

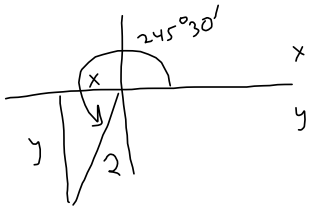
LarTrig9 4.3.043. (2446538) (Add) -- view

(13) Write the standard form of the complex number. (Round numerical values to four decimal places.)

$2[\cos(245° 30') + i \sin(245° 30')]$

$-0.8294 - 1.8199i$

$-.8294 - 1.8199i$



$x = 2\cos(245°30')$

$y = 2\sin(245°30')$

$\frac{x}{2} = \cos\theta$

$x = 2\cos\theta$

```
2cos(245+30/60)
     -.8293864853
2sin(245+30/60)
     -1.819922542
```

LarTrig9 4.3.045. (2456493) (Remove) -- view

(14) Use a graphing utility to write the complex number in standard form. (Round all numerical values to four decimal places.)

$8\left(\cos\frac{\pi}{5} + i\sin\frac{\pi}{5}\right)$

$6.4721 + 4.7023i$

? Graph $8(\cos\theta + i\sin\theta)$ & look @ $\frac{\pi}{5}$.

$x = 8\cos\frac{\pi}{5}$

$y = 8\sin\frac{\pi}{5}$

T	X1T	Y1T
.5	7.0207	3.8354
.62832	6.4721	4.7023

T=π/5

T	X1T	Y1T
.5	7.0207	3.8354
.62832	6.4721	4.7023
.62832	6.4721	4.7023

T=

$z \approx 6.4721 + 4.7023i$

15

LarTrig9 4.3.049. (2447270) (Add) -- view

Perform the operation and leave the result in trigonometric form. (Let $0 \le \theta < 2\pi$.)

$$\left[2\left(\cos\frac{\pi}{8} + i\sin\frac{\pi}{8}\right)\right]\left[6\left(\cos\frac{\pi}{24} + i\sin\frac{\pi}{24}\right)\right]$$

$12\left(\cos\left(\frac{\pi}{6}\right) + i\sin\left(\frac{\pi}{6}\right)\right)$

$\frac{\pi}{8} + \frac{\pi}{24} = \frac{3\pi + \pi}{24} = \frac{4\pi}{24} = \frac{\pi}{6}$

$12\left(\cos\frac{\pi}{6} + i\sin\frac{\pi}{6}\right)$

16

LarTrig9 4.3.051. (2447025) (Add) -- view

Perform the operation and leave the result in trigonometric form. (Let $0 \le \theta < 360°$.)

$$\left[\frac{9}{5}(\cos 135° + i\sin 135°)\right]\left[\frac{4}{5}(\cos 60° + i\sin 60°)\right]$$

$\frac{36}{25}(\cos(195°) + i\sin(195°))$

$135° + 60° = 195°$

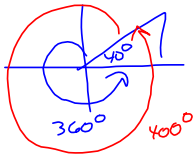
$\frac{36}{25}(\cos 195° + i\sin 195°)$

LarTrig9 4.3.053. (2446505) (Add) -- view

Perform the operation and leave the result in trigonometric form. (Let $0 \le \theta < 360°$.)

$(\cos 80° + i\sin 80°)(\cos 320° + i\sin 320°)$

$\cos(40°) + i\sin(40°)$



$\cos(400°) + i\sin(400°)$

$= \cos(40°) + i\sin(40°)$

17

LarTrig9 4.3.055. (2447289) (Add) -- view

3m

Perform the operation and leave the result in trigonometric form. (Let $0 \le \theta < 2\pi$.)

$$\frac{6(\cos 60° + i \sin 60°)}{54(\cos 20° + i \sin 20°)}$$

$\frac{1}{9}(\cos(40°) + i\sin(40°))$

$\frac{6}{54}(\cos(40^\circ) + i\sin(40^\circ))$

$= \frac{1}{9}(\cos(40^\circ) + i\sin(40^\circ))$

18

LarTrig9 4.3.059. (2447137) (Add) -- view

3m

Perform the operation and leave the result in trigonometric form. (Let $0 \le \theta < 360°$.)

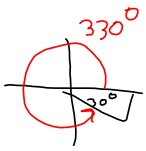
$$\frac{8(\cos 116° + i \sin 116°)}{4(\cos 146° + i \sin 146°)}$$

$2(\cos(330°) + i\sin(330°))$

$116 - 146 = -30^\circ$

$2(\cos(-30^\circ) + i\sin(-30^\circ))$

$2(\cos(330^\circ) + i\sin(330^\circ))$



LarTrig9 4.3.061. (2456887) (Add) -- view

Consider the following.

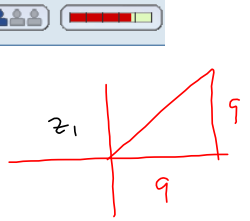
19

$(9 + 9i)(5 - 5i) = 9(1+i)(5)(1-i) = 45(1^2+1^2) = 90$

(a) Write the trigonometric forms of the complex numbers. (Let $0 \le \theta < 2\pi$.)

$(9 + 9i) =$ $9\sqrt{2}\left(\cos\left(\frac{\pi}{4}\right) + i\sin\left(\frac{\pi}{4}\right)\right)$

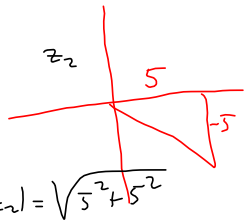
$(5 - 5i) =$ $5\sqrt{2}\left(\cos\left(\frac{7\pi}{4}\right) + i\sin\left(\frac{7\pi}{4}\right)\right)$



$|z_1| = \sqrt{9^2+9^2}$

$= \sqrt{81 \cdot 2}$

$= 9\sqrt{2}$



$|z_2| = \sqrt{5^2+5^2}$

$= \sqrt{50} = 5\sqrt{2}$

$9\sqrt{2}\left(\cos\frac{\pi}{4} + i\sin\frac{\pi}{4}\right) \cdot 5\sqrt{2}\left(\cos\left(-\frac{\pi}{4}\right) + i\sin\left(-\frac{\pi}{4}\right)\right)$

$45 \cdot 2(\cos(0) + i\sin(0))$

$= 90(1 + 0) = 9$

(b) Perform the indicated operation using the trigonometric forms. (Let $0 \le \theta < 2\pi$.)

$90(\cos(0) + i\sin(0))$

(c) Perform the indicated operation using the standard forms, and check your result with that of part (b).

90

20

LarTrig9 4.3.065. (2456535) (Add) -- view

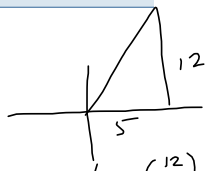
Consider the following.

$\frac{5 + 12i}{1 - \sqrt{3}i}$

(a) Write the trigonometric forms of the complex numbers. (Let $0 \le \theta < 2\pi$. Round your angles to three decimal places.)

$5 + 12i =$ $13(\cos(1.176) + i\sin(1.176))$

$1 - \sqrt{3}i =$ $2\left(\cos\left(\frac{5\pi}{3}\right) + i\sin\left(\frac{5\pi}{3}\right)\right)$

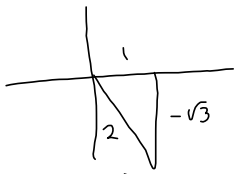


$\theta_1 = \arctan\left(\frac{12}{5}\right)$

$\approx$

$|z_1| = \sqrt{5^2+12^2}$

$= \sqrt{169} = 13$



300° $\frac{5\pi}{3}$

$|z_2| = 2$

(b) Perform the indicated operation using the trigonometric forms. (Let $0 \le \theta < 2\pi$. Round your angles to three decimal places.)

$\frac{13}{2}(\cos(2.223) + i\sin(2.223))$

$\frac{13}{2}\left(\cos(-4.060) + i\sin(-4.060)\right)$

$2\pi - 4.060 \approx 2.2232$

$\frac{13}{2}(\cos(2.2232) + i\sin(2.2232))$

(c) Perform the indicated operation using the standard forms, and check your result with that of part (b). (Round all numerical values to three decimal places.)

$-3.946 + 5.165i$

≈ -4.060

```
tan⁻¹(12/5)
      1.176005207
Ans-300*π/180
     -4.059982549
Ans+2π
      2.223202758
```

$\left(\frac{5 + 12i}{1 - \sqrt{3}i}\right)\left(\frac{1 + \sqrt{3}i}{1 + \sqrt{3}i}\right) = \frac{5 + 5\sqrt{3}i + 12i + 12\sqrt{3}i^2}{1^2 + 3} = \frac{(5 - 12\sqrt{3}) + (12 + 5\sqrt{3})i}{4}$

$\approx -3.946 + 5.165i$

```
      1.176005207
5-12√(3)
     -15.78460969
Ans/4
     -3.946152423
(12+5√(3))/4
      5.165063509
```

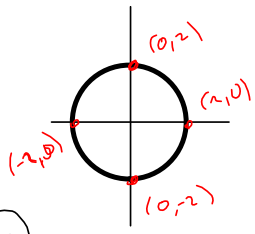
Nov 10-9:46 AM

LarTrig9 4.3.069. (2532485) (Add) -- view

Comment: not randomized

Sketch the graph of all complex numbers z satisfying the given condition.

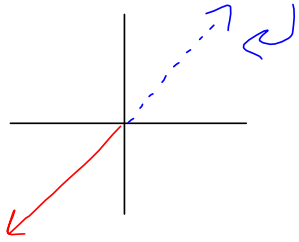
$|z| = 2$



LarTrig9 4.3.072. (2456653) (Remove) -- view

Sketch the graph of all complex numbers z satisfying the given condition.

$\theta = \frac{5\pi}{4}$



In future ------->

$z = r(\cos\theta + i\sin\theta)$

r might not always be positive.

See Polar Coordinates!

Nov 10-9:47 AM