Period 4, March 13, 2025

Solve the system by the method of your choice.

$$\frac{5(x+4)}{5\cdot 4} - \frac{4(y+8)}{5\cdot 4} = 5 = \frac{5x+20}{20} - \frac{4y+32}{20} \Rightarrow 20\cdot\frac{5x+20-4y-32}{\cancel{20}} = 5\cdot 20$$

$$\frac{4(x+y)}{4\cdot 9} = \frac{9(x-y)}{4\cdot 9} - \frac{9\cdot 9}{4\cdot 9} = \frac{4x+4y}{36} = \frac{9x-9y}{36} - \frac{81}{36} \Rightarrow 36\cdot\frac{4x+4y}{\cancel{36}} = \frac{9x-9y-81}{\cancel{36}}\cdot 36$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. The solution set is $\left\{\left(\frac{1132}{45}, \frac{31}{9}\right)\right\}$. (Type an ordered pair.)
- B. There are infinitely many solutions.
- C. There is no solution.

$$5x - 4y = 112$$
$$-5x + 13y = -81$$

$\Leftarrow 5x+20-4y-32=100$

$\Leftarrow 4x+4y = 9x-9y-81$

Solve the logarithmic equation. Be sure to reject any value of x that is not in the domain of the original logarithmic expressions. Give the exact answer.

$\log_6(x+8) + \log_6(x+3) = 1 \Rightarrow \log_6(x+8)(x+3) = 1 \Rightarrow 6^1 = (x+8)(x+3)$

Solve the equation. Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. The solution set is $\{-2\}$. (Simplify your answer. Use a comma to separate answers as needed.)
- B. There are infinitely many solutions.
- C. There is no solution.

$$6 = x^2 + 3x + 8x + 24$$
$$-6 \qquad\qquad -6$$
$$0 = 1x^2 + 11x + 18$$
$$1\cdot 18 = 18$$
$$9 \quad 2$$
$$0 = x^2 + 9x + 2x + 18$$
$$x(x+9) + 2(x+9)$$
$$0 = (x+9)(x+2) \Rightarrow x = \cancel{-9}, -2$$

$$\log_6(-2+8) + \log_6(-2+3)$$
$$\log_6(6) + \log_6(1)$$
$$\log_6(-9+8) + \log_6(-9+3)$$
$$\log_6 \cancel{(-1) + \log_6(-6)}$$

nope

Solve the system by the method of your choice.

$$\begin{cases} 3x = 2y + 1 \\ 6x = -3 - 3y \end{cases}$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ○ **A.** The solution set is {☐}.
  (Type an integer or a simplified fraction. Type an ordered pair.)
- ○ **B.** There are infinitely many solutions. The solution set is {(x,y)|3x = 2y + 1} or {(x,y)|6x = − 3 − 3y}.
- ○ **C.** The solution set is ∅.

$$\begin{aligned} 3x &= 2y+1 \\ 6x &= -3-3y \end{aligned} \Rightarrow \begin{aligned} (3x &= 2y+1)\cdot -2 \\ 6x &= -3y-3 \end{aligned} \Rightarrow \begin{aligned} -6x &= -4y-2 \\ 6x &= -3y-3 \end{aligned}$$

$$0 = -7y - \cancel{5}$$

$$+5 \qquad +\cancel{5}$$

$$\frac{-5}{7} = y$$

$$6x = -3 - 3\left(\frac{-5}{7}\right)$$

$$6x = -\frac{3\cdot 7}{1\cdot 7} + \frac{15}{7}$$

$$6x = \frac{-21}{7} + \frac{15}{7} = \frac{-6}{7}$$

$$\frac{\cancel{6}x}{\cancel{6}} = -\frac{\cancel{6}}{7\cdot\cancel{6}}$$

$$x = -\frac{6}{42} = \frac{-1}{7}$$

Determine whether the statement makes sense or does not make sense, and explain your reasoning.

One should mix 5 liters of a 20% acid solution with 5 liters of a 10% acid solution to obtain 10 liters of a 30% acid solution.

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. The statement makes sense because the quantity of the resultant mixture is the sum of the quantities of the individual solutions. Similarly, the concentration of the resultant mixture is the sum of the concentrations of the individual solutions.
- B. The statement does not make sense because the resultant mixture will be 10 liters of a 15 % acid solution.
- C. The statement does not make sense because the resultant mixture will be ___ liters of a 30% acid solution.

5liters of 20% To get 10 Liters of 30%

5liters of 10%

How much acid in 5liters of 20% acid

$5(.2) = 1$ Liter of acid

5liters of 10% acid

$5(.1) = .5$ Liter of acid

10Liters with 1.5 Liters being acid

10Liters with 15% acid

10 Liters with 30% acid

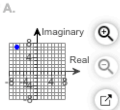
$10(.3) = 3$ Liters of acid

Plot the complex number. Then write it in polar form.

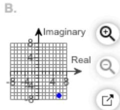
$-4\sqrt{2} - 4i\sqrt{3}$

Plot the complex number $-4\sqrt{2} - 4i\sqrt{3}$. Choose the correct graph below.

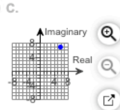
A.



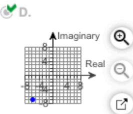
B.



C.



D.



Write $-4\sqrt{2} - 4i\sqrt{3}$ in polar form. Select the correct choice below and fill in the answer boxes to complete your choice.

(Type an exact answer in the first answer box. Simplify your answer. Type any angle measures in degrees, rounding to the nearest tenth as needed. Use angle measures greater than or equal to 0° and less than 360°.)

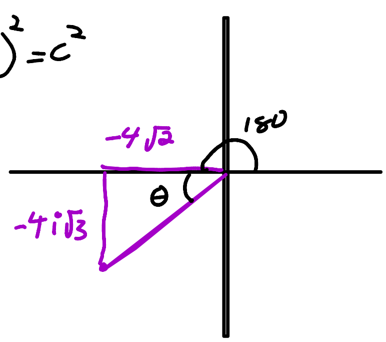
$(-4\sqrt{3})^2 + (-4\sqrt{2})^2 = c^2$

$48 + 32 = c^2$

$80 = c^2$

$\sqrt{80} = c$

$4\sqrt{5} = c$



$\tan^{-1} \frac{\sqrt{3}}{\sqrt{2}} = 50.768^\circ$

$180 + 50.768 = 230.768$

$4\sqrt{5}(i\cos 230.768^\circ + i\sin 230.768^\circ)$

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

$$\left[\frac{1}{3}\left(\cos\frac{\pi}{12}+i\sin\frac{\pi}{12}\right)\right]^6 = \left(\frac{1}{3}\right)^6\left(\cos 6\cdot\frac{\pi}{12}+i\sin 6\cdot\frac{\pi}{12}\right) = \frac{1}{3^6}\left(\cos\frac{\pi}{2}+i\sin\frac{\pi}{2}\right)$$

$\frac{\pi}{2}$

$$\left[\frac{1}{3}\left(\cos\frac{\pi}{12}+i\sin\frac{\pi}{12}\right)\right]^6 = \frac{i}{729}$$

$\frac{1}{729}(0+i\cdot 1)$

$\frac{i}{729}$

Find the product of the complex numbers. Leave your answer in polar form.

$z_1 = 8(\cos 30^\circ + i\sin 30^\circ) \qquad z_2 = 2(\cos 75^\circ + i\sin 75^\circ)$

$z_1z_2 = 16(\cos 105^\circ + i\sin 105^\circ)$

(Simplify your answer. Use integers or fractions for any numbers in the expression.)

$8\cdot 2(\cos(30+75)+i\sin(30+75))$

$16(\cos 105+i\sin 105)$

Find all the complex cube roots of $w = 125(\cos 270^\circ + i \sin 270^\circ)$. Write the roots in polar form with θ in degrees.

$\sqrt[3]{125} = 5$

$z_0 = 5(\cos 90^\circ + i \sin 90^\circ)$
(Type answers in degrees. Simplify your answer.)

$z_1 = 5(\cos 210^\circ + i \sin 210^\circ)$
(Type answers in degrees. Simplify your answer.)

$5\left(\cos \frac{270+360k}{n=3} + i \sin \frac{270+360k}{n=3}\right)$

$z_2 = 5(\cos 330^\circ + i \sin 330^\circ)$
(Type answers in degrees. Simplify your answer.)

$5(\cos 90 + i \sin 90) = 5\left(\cos \frac{270+360(0)}{3} + i \sin \frac{270+360(0)}{3}\right)$

$630/3 = 210$

$5(\cos 210 + i \sin 210) = 5\left(\cos \frac{270+360(1)}{3} + i \sin \frac{270+360(1)}{3}\right)$

$270+720$ $\quad 990/3 = 330$

$5(\cos 330 + i \sin 330) = 5\left(\cos \frac{270+360(2)}{3} + i \sin \frac{270+360(2)}{3}\right)$

Write the following complex number in rectangular form.

$14(\cos 225^\circ + i \sin 225^\circ) = 14\left(-\frac{\sqrt{2}}{2}\right) + i \cdot 14\left(-\frac{\sqrt{2}}{2}\right) = -\frac{14\sqrt{2}}{2} - i\frac{14\sqrt{2}}{2}$

The rectangular form of $14(\cos 225^\circ + i \sin 225^\circ)$ is $-7\sqrt{2} - 7\sqrt{2}\,i$. $= -7\sqrt{2} - 7i\sqrt{2}$

(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression. Rationalize all denominators. Type your answer in the form a + b*i*.)

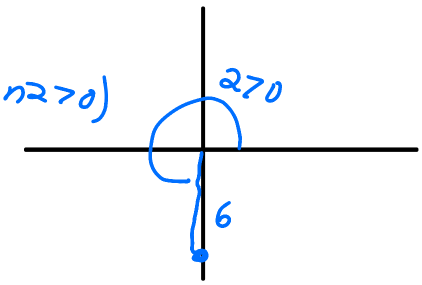
Plot the complex number. Then write the complex number in polar form. Express the argument in degrees.

$-6i$

Plot the complex number on the complex plane to the right.

Write the complex number $z = -6i$ in polar form. Select the correct choice below and fill in the answer box(es) within your choice.
(Type exact answers, using radicals as needed. Simplify your answers.)

- A. $z = \square(\sin \square° + i \sin \square°)$
- B. $z = 6(\cos 270° + i \sin 270°)$ $= 6(\cos 270 + i \sin 270)$
- C. $z = \square(\sin \square° + i \cos \square°)$
- D. $z = \square(\cos \square° + i \cos \square°)$



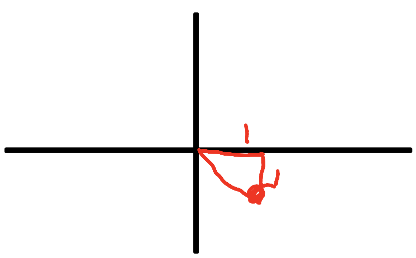
Plot the complex number and find its absolute value.

$1 - i$

Plot the complex number on the complex plane to the right.

The absolute value of the complex number is $|1 - i| = \sqrt{2}$.
(Simplify your answer. Type an exact answer, using radicals as needed.)

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



Find the quotient $\frac{z_1}{z_2}$ of the complex numbers. Leave your answer in polar form.

$z_1 = 9\left(\cos\frac{\pi}{10} + i\sin\frac{\pi}{10}\right)$ $z_2 = 10\left(\cos\frac{\pi}{12} + i\sin\frac{\pi}{12}\right)$ $\Rightarrow \frac{9}{10}\left(\cos\left(\frac{\pi}{10}-\frac{\pi}{12}\right) + i\sin\left(\frac{\pi}{10}-\frac{\pi}{12}\right)\right)$

$\frac{z_1}{z_2} = \frac{9}{10}\left(\cos\frac{\pi}{60} + i\sin\frac{\pi}{60}\right)$

$\frac{9}{10}\left(\cos\frac{\pi}{60} + i\sin\frac{\pi}{60}\right)$

$\frac{6\cdot\pi}{6\cdot 10} - \frac{\pi\cdot 5}{12\cdot 5} = \frac{6\pi}{60} - \frac{5\pi}{60} = \frac{\pi}{60}$

Let $\mathbf{u} = -8\mathbf{i} + 7\mathbf{j}$, $\mathbf{v} = 5\mathbf{i} - \mathbf{j}$, and $\mathbf{w} = -2\mathbf{i}$. Find $3\mathbf{u} - (5\mathbf{v} - \mathbf{w})$.

$3\mathbf{u} - (5\mathbf{v} - \mathbf{w}) = -51\mathbf{i} + 26\mathbf{j}$ (Type your answer in terms of i and j.)

$3(-8i+7j) - [5(5i-j) - (-2i)]$

$-24i + 21j - [25i - 5j + 2i]$

$-24i + 21j - [27i - 5j]$

$-24i + 21j - 27i + 5j$

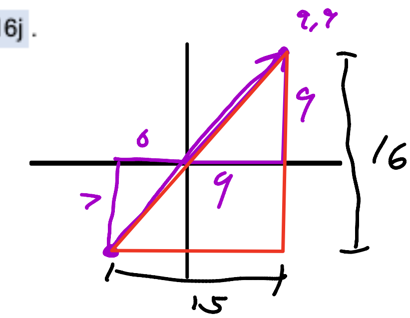
$-51i + 26j$

Let **v** be the vector from initial point $P_1 = (-6, -7)$ to terminal point $P_2 = (9,9)$. Write **v** in terms of **i** and **j**.

The vector from point $P_1 = (-6, -7)$ to point $P_2 = (9,9)$ is **v** = 15i + 16j .

(Simplify your answer. Type your answer in terms of i and j.)

$15\hat{i} + 16\hat{j}$



Let **v** = −7**i** + 8**j** and **w** = −**i** − 2**j**. Find 9**v** − 8**w**.

9**v** − 8**w** = −55i + 88j (Simplify your answer. Type your answer in terms of i and j.)

$9(-7\hat{i}+8\hat{j}) - 8(-\hat{i}-2\hat{j})$

$-63\hat{i} + 72\hat{j} + 8\hat{i} + 16\hat{j}$

$-55\hat{i} + 88\hat{j}$

Find the unit vector that has the same direction as the vector **v**.

v = 4**i** + **j** $\qquad \|v\| = \sqrt{4^2 + 1^2} = \sqrt{17}$

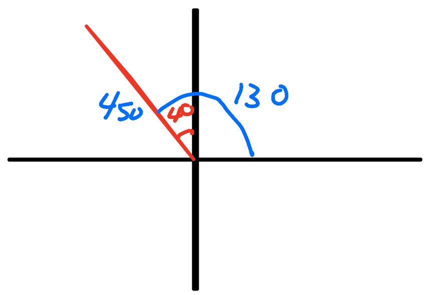
The unit vector that has the same direction as the vector **v** = 4**i** + **j** is $\frac{4\sqrt{17}}{17}i + \frac{\sqrt{17}}{17}j$.

(Simplify your answer, including any radicals. Type your answer in the form ai + bj. Use inte

$\text{unit vector} = \frac{(4\hat{i}+\hat{j})\sqrt{17}}{\sqrt{17}\cdot\sqrt{17}} = \frac{4\sqrt{17}\,\hat{i}}{17} + \frac{\sqrt{17}\,\hat{j}}{17}$

A vector is described. Express the vector in terms of **i** and **j**. If exact values are not possible, round components to the nearest tenth.

A plane with an airspeed of 450 miles per hour is flying in the direction N40°W.



$450(i\cos 130 + j\sin 130)$

Let **u** = 5i − 2**j**, and **v** = − 5i + 2**j**. Find **u** − **v**.

u − **v** = 10i − 4j (Type your answer in terms of i and j.)

$(5i - 2j) - (-5i + 2j)$

$5i - 2j + 5i - 2j$

$10i - 4j$