

Write in complex form:

1) $\sqrt{-25}$

$$\sqrt{25}i = 5i$$

2) $\sqrt{-64}$

$$\sqrt{64}i = 8i$$

3) $\sqrt{-14}$

$$\sqrt{14}i = i\sqrt{14}$$

4) $\sqrt{-32}$

$$= \sqrt{16}\sqrt{2}i = 4i\sqrt{2}$$

Perform the addition, subtraction, or multiplication and write the result in standard form.

5) $(5+i) + (6-2i) =$

$$11-i$$

6) $(13-\sqrt{-4}) + (-5+\sqrt{-36}) =$

$$8-\sqrt{4}i+\sqrt{36}i = 8-2i+6i = 8+4i$$

7) $(8-i) - (4-i) =$

$$8-i-4+i = 4$$

8) $(3+\sqrt{-4}) - (6+\sqrt{-169}) =$

$$3+2i-6-\sqrt{169}i = 3+2i-6-13i = -3-11i$$

9) $5i(3-2i) =$

$$15i-10i^2 = 15i-10(-1) = 15i+10$$

10) $(6-2i)(2-3i) =$

$$12-18i-4i+6i^2 = 12-22i+6(-1) = 6-22i$$

Write the complex conjugate of the number. Then multiply the two quantities.

11) $6+3i$, $6-3i$

$$36-9i^2 = 36-9(-1) = 45$$

12) $7-12i$, $7+12i$

$$49-144i^2 = 49-144(-1) = 193$$

13) $-3+\sqrt{2}i$, $-3-\sqrt{2}i$

$$9-\sqrt{4}i^2 = 9-2(-1) = 11$$

Write the quotient in standard form.

$$14) \frac{6-7i}{1+2i} \cdot \frac{(1-2i)}{(1-2i)} = \frac{6-14i-7i+14i^2}{1-4i^2} = \frac{6-19i+14(-1)}{1-4(-1)} = \frac{-8-19i}{5} = -\frac{8}{5} - \frac{19}{5}i$$

$$15) \frac{8+16i}{3-i} \cdot \frac{(3+i)}{(3+i)} = \frac{24+8i+48i+16i^2}{9-i^2} = \frac{8+56i}{10} = \frac{8}{10} + \frac{56}{10}i = \frac{4}{5} + \frac{28}{5}i$$

$$16) \frac{6-5i}{2i} \cdot \frac{(2i)}{(2i)} = \frac{12i-10i^2}{4i^2} = \frac{12i-10(-1)}{4(-1)} = \frac{10+12i}{-4} = -\frac{5}{2} - 3i$$

For questions 17 – 19, find all zeros of the given polynomials.

17) $x^3 - 4x^2 + 6x - 4 = 0$ 1, 2, 4

$$2 \left| \begin{array}{cccc} 1 & -4 & 6 & -4 \\ & 2 & -4 & 4 \\ \hline 1 & -2 & 2 & 0 \end{array} \right. \quad (x-2)(x^2-2x+2)$$

$$\frac{2 \pm \sqrt{-4}}{2} = \frac{2 \pm 2i}{2} = 1 \pm i \quad x = 2, 1+i, 1-i$$

18) $x^3 - 4x^2 + 9x - 36 = 0$

$$4 \left| \begin{array}{cccc} 1 & -4 & 9 & -36 \\ & 4 & 0 & 36 \\ \hline 1 & 0 & 9 & 0 \end{array} \right. \quad (x-4)(x^2+9)$$

$$\frac{0 \pm \sqrt{-36}}{2} = \frac{\pm 6i}{2} = \pm 3i \quad x = 4, x = 3i, x = -3i$$

19) $x^3 + 10x^2 + 33x + 34 = 0$

$$-2 \left| \begin{array}{cccc} 1 & 10 & 33 & 34 \\ & -2 & -16 & -34 \\ \hline 1 & 8 & 17 & 0 \end{array} \right. \quad (x+2)(x^2+8x+17)$$

$$\frac{-8 \pm \sqrt{-4}}{2} = \frac{-8 \pm 2i}{2} = -4 \pm i \quad x = -2, -4+i, -4-i$$