Compute the sum and product of a and b:

1. $a = -5 + 2i$; $b = -5 + 9i$
2. $a = 10 - 1i$; $b = 10 + 7i$
3. $a = 1 + 3i$; $b = 9 + 1i$
4. $a = 8 - 5i$; $b = -5 - 2i$
5. $a = -2 + 9i$; $b = 5 + 5i$
6. $a = 9 + 8i$; $b = 3 + 5i$
7. $a = 5 + 7i$; $b = -3 + 5i$
8. $a = -1 + 4i$; $b = -4 + 10i$
9. $a = 5 + 5i$; $b = 2 + 1i$
10. $a = -3$; $b = -4$
11. $a = 2 + 8i$; $b = 10 + 10i$
12. $a = 3 + 2i$; $b = 9 - 2i$
13. $a = -1 + 6i$; $b = -3 - 2i$
14. $a = -3 + 1i$; $b = 8 + 6i$
15. $a = -1i$; $b = -4 + 1i$
16. $a = -4 + 2i$; $b = 5 - 1i$
17. $a = 8 + 7i$; $b = 9$
18. $a = 10 + 4i$; $b = -4 + 4i$
19. $a = -1 + 10i$; $b = 5 + 3i$
20. $a = 5 - 4i$; $b = 7i$

Solutions:

1. $a + b = -10 + 11i$; $ab = 7 - 55i$
2. $a + b = 20 + 6i$; $ab = 107 + 60i$
3. $a + b = 10 + 4i$; $ab = 6 + 28i$
4. $a + b = 3 - 7i$; $ab = -50 + 9i$
5. $a + b = 3 + 14i$; $ab = -55 + 35i$
6. $a + b = 12 + 13i$; $ab = -13 + 69i$
7. $a + b = 2 + 12i$; $ab = -50 + 4i$
8. $a + b = -5 + 14i$; $ab = -36 - 26i$
9. $a + b = 7 + 6i$; $ab = 5 + 15i$
10. $a + b = -7$; $ab = 12$
11. $a + b = 12 + 18i$; $ab = -60 + 100i$
12. $a + b = 12$; $ab = 31 + 12i$
13. $a + b = -4 + 4i$; $ab = 15 - 16i$
14. $a + b = 5 + 7i$; $ab = -30 - 10i$
15. $a + b = -4$; $ab = 1 + 4i$
16. $a + b = 1 + 1i$; $ab = -18 + 14i$
17. $a + b = 17 + 7i$; $ab = 72 + 63i$
18. $a + b = 6 + 8i$; $ab = -56 + 24i$
19. $a + b = 4 + 13i$; $ab = -35 + 47i$
20. $a + b = 5 + 3i$; $ab = 28 + 35i$

Express z in standard form:

1. $z = \dfrac{1-4i}{2-i}$
2. $z = \dfrac{-2+6i}{4+3i}$
3. $z = \dfrac{9+2i}{10-i}$
4. $z = \dfrac{-5+5i}{1+6i}$
5. $z = \dfrac{9i}{6+4i}$
6. $z = \dfrac{-3+4i}{-4}$
7. $z = \dfrac{3+9i}{-1-5i}$
8. $z = \dfrac{2-3i}{-3+i}$
9. $z = \dfrac{3-5i}{-1+7i}$
10. $z = \dfrac{6+8i}{6+2i}$
11. $z = \dfrac{-1+10i}{1+4i}$
12. $z = \dfrac{-2+8i}{1}$
13. $z = \dfrac{-5+5i}{3-2i}$
14. $z = \dfrac{10-4i}{-5}$
15. $z = \dfrac{5+5i}{9+10i}$
16. $z = \dfrac{-3+i}{5+6i}$
17. $z = \dfrac{-3-2i}{2+4i}$
18. $z = \dfrac{-1+5i}{6+6i}$
19. $z = \dfrac{-3+3i}{-4+7i}$
20. $z = \dfrac{5+i}{1-2i}$

Solutions:

1. $z = \dfrac{6}{5} - \dfrac{7}{5}i$
2. $z = \dfrac{2}{5} + \dfrac{6}{5}i$
3. $z = \dfrac{88}{101} + \dfrac{29}{101}i$
4. $z = \dfrac{25}{37} + \dfrac{35}{37}i$
5. $z = \dfrac{9}{13} + \dfrac{27}{26}i$
6. $z = \dfrac{3}{4} - i$
7. $z = -\dfrac{24}{13} + \dfrac{3}{13}i$
8. $z = -\dfrac{9}{10} + \dfrac{7}{10}i$
9. $z = -\dfrac{19}{25} - \dfrac{8}{25}i$
10. $z = \dfrac{13}{10} + \dfrac{9}{10}i$
11. $z = \dfrac{39}{17} + \dfrac{14}{17}i$
12. $z = -2 + 8i$
13. $z = -\dfrac{25}{13} + \dfrac{5}{13}i$
14. $z = -2 + \dfrac{4}{5}i$
15. $z = \dfrac{95}{181} - \dfrac{5}{181}i$
16. $z = -\dfrac{9}{61} + \dfrac{23}{61}i$
17. $z = -\dfrac{7}{10} + \dfrac{2}{5}i$
18. $z = \dfrac{1}{3} + \dfrac{1}{2}i$
19. $z = \dfrac{33}{65} + \dfrac{9}{65}i$
20. $z = \dfrac{3}{5} + \dfrac{11}{5}i$

Find $|z|$:

1. $z = \dfrac{7}{1+3i}$
2. $z = \dfrac{7}{9i}$
3. $z = \dfrac{1}{1}$
4. $z = \dfrac{2}{5+3i}$
5. $z = 5+6i$
6. $z = -2-2i$
7. $z = 10-i$
8. $z = -2+6i$
9. $z = 5+10i$
10. $z = \dfrac{5}{8+2i}$
11. $z = -3+8i$
12. $z = 8+7i$
13. $z = \dfrac{8}{5-3i}$
14. $z = 9+3i$
15. $z = 8-2i$
16. $z = -3+10i$
17. $z = \dfrac{6}{2+i}$
18. $z = 8+5i$
19. $z = \dfrac{-4}{-1-5i}$
20. $z = 8+6i$

Solutions:

1. $|z| = 7\sqrt{\dfrac{1}{10}} = \dfrac{7}{10}\sqrt{2}\sqrt{5}$
2. $|z| = \dfrac{7}{9}$
3. $|z| = 1$
4. $|z| = \sqrt{\dfrac{2}{17}} = \dfrac{1}{17}\sqrt{2}\sqrt{17}$
5. $|z| = \sqrt{61}$
6. $|z| = 2\sqrt{2}$
7. $|z| = \sqrt{101}$
8. $|z| = 2\sqrt{10} = 2\sqrt{2}\sqrt{5}$
9. $|z| = 5\sqrt{5}$
10. $|z| = \dfrac{5}{2}\sqrt{\dfrac{1}{17}} = \dfrac{5}{34}\sqrt{17}$
11. $|z| = \sqrt{73}$
12. $|z| = \sqrt{113}$
13. $|z| = 4\sqrt{\dfrac{2}{17}} = \dfrac{4}{17}\sqrt{2}\sqrt{17}$
14. $|z| = 3\sqrt{10} = 3\sqrt{2}\sqrt{5}$
15. $|z| = 2\sqrt{17}$
16. $|z| = \sqrt{109}$
17. $|z| = 6\sqrt{\dfrac{1}{5}} = \dfrac{6}{5}\sqrt{5}$
18. $|z| = \sqrt{89}$
19. $|z| = 2\sqrt{\dfrac{2}{13}} = \dfrac{2}{13}\sqrt{2}\sqrt{13}$
20. $|z| = 10$

Write z in polar form:

1. $z = -5 + 5\sqrt{3}i$
2. $z = -2i$
3. $z = 1 + \sqrt{3}i$
4. $z = 1 + \sqrt{3}i$
5. $z = 0$
6. $z = -\frac{3}{2} - \frac{3}{2}\sqrt{3}i$
7. $z = -\frac{5}{2} + \frac{5}{2}\sqrt{3}i$
8. $z = -1 - \sqrt{3}i$
9. $z = 4 + 4\sqrt{3}i$
10. $z = -2 + 2\sqrt{3}i$
11. $z = \frac{1}{2} + \frac{1}{2}\sqrt{3}i$
12. $z = 3i$
13. $z = i$
14. $z = -7i$
15. $z = -i$
16. $z = 6i$
17. $z = 9i$
18. $z = -3i$
19. $z = 2i$
20. $z = -3i$

Solutions:

1. $z = 10\left(\cos\left(\frac{2}{3}\pi\right) + i\sin\left(\frac{2}{3}\pi\right)\right)$
2. $z = 2\left(\cos\left(-\frac{1}{2}\pi\right) + i\sin\left(-\frac{1}{2}\pi\right)\right)$
3. $z = 2\left(\cos\left(\frac{1}{3}\pi\right) + i\sin\left(\frac{1}{3}\pi\right)\right)$
4. $z = 2\left(\cos\left(\frac{1}{3}\pi\right) + i\sin\left(\frac{1}{3}\pi\right)\right)$
5. $z = 0$
6. $z = 3\left(\cos\left(-\frac{2}{3}\pi\right) + i\sin\left(-\frac{2}{3}\pi\right)\right)$
7. $z = 5\left(\cos\left(\frac{2}{3}\pi\right) + i\sin\left(\frac{2}{3}\pi\right)\right)$
8. $z = 2\left(\cos\left(-\frac{2}{3}\pi\right) + i\sin\left(-\frac{2}{3}\pi\right)\right)$
9. $z = 8\left(\cos\left(\frac{1}{3}\pi\right) + i\sin\left(\frac{1}{3}\pi\right)\right)$
10. $z = 4\left(\cos\left(\frac{2}{3}\pi\right) + i\sin\left(\frac{2}{3}\pi\right)\right)$
11. $z = \cos\left(\frac{1}{3}\pi\right) + i\sin\left(\frac{1}{3}\pi\right)$
12. $z = 3\left(\cos\left(\frac{1}{2}\pi\right) + i\sin\left(\frac{1}{2}\pi\right)\right)$
13. $z = \left(\cos\left(\frac{1}{2}\pi\right) + i\sin\left(\frac{1}{2}\pi\right)\right)$
14. $z = 7\left(\cos\left(-\frac{1}{2}\pi\right) + i\sin\left(-\frac{1}{2}\pi\right)\right)$
15. $z = \cos\left(-\frac{1}{2}\pi\right) + i\sin\left(-\frac{1}{2}\pi\right)$
16. $z = 6\left(\cos\left(\frac{1}{2}\pi\right) + i\sin\left(\frac{1}{2}\pi\right)\right)$
17. $z = 9\left(\cos\left(\frac{1}{2}\pi\right) + i\sin\left(\frac{1}{2}\pi\right)\right)$
18. $z = 3\left(\cos\left(-\frac{1}{2}\pi\right) + i\sin\left(-\frac{1}{2}\pi\right)\right)$
19. $z = 2\left(\cos\left(\frac{1}{2}\pi\right) + i\sin\left(\frac{1}{2}\pi\right)\right)$
20. $z = 3\left(\cos\left(-\frac{1}{2}\pi\right) + i\sin\left(-\frac{1}{2}\pi\right)\right)$

Write z in exponential form:

1. $z = 4i$
2. $z = -5\sqrt{2} - 5\sqrt{2}i$
3. $z = -\frac{7}{2} - \frac{7}{2}\sqrt{3}i$
4. $z = -1 - \sqrt{3}i$
5. $z = \frac{1}{2} + \frac{1}{2}\sqrt{3}i$
6. $z = 8i$
7. $z = -\frac{3}{2} + \frac{3}{2}\sqrt{3}i$
8. $z = -5i$
9. $z = -\frac{3}{2}\sqrt{3} - \frac{3}{2}i$
10. $z = -\frac{5}{2}\sqrt{2} - \frac{5}{2}\sqrt{2}i$
11. $z = i$
12. $z = 9i$
13. $z = -3i$
14. $z = \frac{5}{2}\sqrt{2} + \frac{5}{2}\sqrt{2}i$
15. $z = \sqrt{2} + \sqrt{2}i$
16. $z = -3 - 3\sqrt{3}i$
17. $z = -3i$
18. $z = -4i$
19. $z = -\frac{9}{2} + \frac{9}{2}\sqrt{3}i$
20. $z = -4\sqrt{2} - 4\sqrt{2}i$

Solutions:

1. $z = 4e^{\frac{1}{2}\pi i}$
2. $z = 10e^{-\frac{3}{4}\pi i}$
3. $z = 7e^{-\frac{2}{3}\pi i}$
4. $z = 2e^{-\frac{2}{3}\pi i}$
5. $z = e^{\frac{1}{3}\pi i}$
6. $z = 8e^{\frac{1}{2}\pi i}$
7. $z = 3e^{\frac{2}{3}\pi i}$
8. $z = 5e^{-\frac{1}{2}\pi i}$
9. $z = 3e^{-\frac{5}{6}\pi i}$
10. $z = 5e^{-\frac{3}{4}\pi i}$
11. $z = e^{\frac{1}{2}\pi i}$
12. $z = 9e^{\frac{1}{2}\pi i}$
13. $z = 3e^{-\frac{1}{2}\pi i}$
14. $z = 5e^{\frac{1}{4}\pi i}$
15. $z = 2e^{\frac{1}{4}\pi i}$
16. $z = 6e^{-\frac{2}{3}\pi i}$
17. $z = 3e^{-\frac{1}{2}\pi i}$
18. $z = 4e^{-\frac{1}{2}\pi i}$
19. $z = 9e^{\frac{2}{3}\pi i}$
20. $z = 8e^{-\frac{3}{4}\pi i}$

Write z in rectangular form:

1. $z = -3e^{-\frac{5}{3}\pi i}$
2. $z = 10e^{-\frac{1}{3}\pi i}$
3. $z = 10e^{\frac{3}{4}\pi i}$
4. $z = -2e^{\frac{1}{2}\pi i}$
5. $z = 4e^{\frac{17}{4}\pi i}$
6. $z = 10e^{\frac{11}{3}\pi i}$
7. $z = e^{-\frac{5}{6}\pi i}$
8. $z = 6e^{\frac{10}{3}\pi i}$
9. $z = 4e^{\frac{5}{2}\pi i}$
10. $z = -3e^{\frac{7}{3}\pi i}$
11. $z = -e^{-\frac{4}{3}\pi i}$
12. $z = -5e^{\frac{1}{2}\pi i}$
13. $z = -3e^{\frac{19}{4}\pi i}$
14. $z = 6e^{\frac{11}{3}\pi i}$
15. $z = -2e^{\frac{8}{3}\pi i}$
16. $z = e^{\frac{5}{3}\pi i}$
17. $z = 9e^{\frac{1}{4}\pi i}$
18. $z = 0e^{\frac{2}{3}\pi i}$
19. $z = -e^{\frac{15}{2}\pi i}$
20. $z = 10e^{-\frac{1}{2}\pi i}$

Solutions:

1. $z = -\frac{3}{2} - \frac{3}{2}\sqrt{3}i$
2. $z = 5 - 5\sqrt{3}i$
3. $z = -5\sqrt{2} + 5\sqrt{2}i$
4. $z = -2i$
5. $z = 2\sqrt{2} + 2\sqrt{2}i$
6. $z = 5 - 5\sqrt{3}i$
7. $z = -\frac{1}{2}\sqrt{3} - \frac{1}{2}i$
8. $z = -3 - 3\sqrt{3}i$
9. $z = 4i$
10. $z = -\frac{3}{2} - \frac{3}{2}\sqrt{3}i$
11. $z = \frac{1}{2} - \frac{1}{2}\sqrt{3}i$
12. $z = -5i$
13. $z = \frac{3}{2}\sqrt{2} - \frac{3}{2}\sqrt{2}i$
14. $z = 3 - 3\sqrt{3}i$
15. $z = 1 - \sqrt{3}i$
16. $z = \frac{1}{2} - \frac{1}{2}\sqrt{3}i$
17. $z = \frac{9}{2}\sqrt{2} + \frac{9}{2}\sqrt{2}i$
18. $z = 0$
19. $z = i$
20. $z = -10i$

Find all solutions for z in the following equations:

1. $z^4 = 5$
2. $z^5 = 12e^{\frac{1}{2}\pi i}$
3. $z^3 = 10$
4. $z^2 = -\frac{7}{2}\sqrt{2} + \frac{7}{2}\sqrt{2}i$
5. $z^5 = 8e^{\frac{1}{2}\pi i}$
6. $z^2 = -3 + 3\sqrt{3}i$
7. $z^4 = 4i$
8. $z^5 = 3e^{\frac{5}{6}\pi i}$
9. $z^5 = 0$
10. $z^5 = 5e^{\frac{1}{2}\pi i}$
11. $z^2 = 10i$
12. $z^4 = 4e^{\frac{2}{3}\pi i}$
13. $z^3 = 8$
14. $z^4 = e^{\frac{1}{4}\pi i}$
15. $z^2 = 3e^{\frac{1}{2}\pi i}$
16. $z^2 = 12e^{\frac{1}{2}\pi i}$
17. $z^4 = \frac{3}{2}\sqrt{2} - \frac{3}{2}\sqrt{2}i$
18. $z^3 = 1$
19. $z^3 = 3i$
20. $z^2 = 2e^{\frac{1}{2}\pi i}$

Solutions:

1. $z \in \left\{ \sqrt[4]{5}, \sqrt[4]{5}e^{\frac{1}{2}\pi i}, \sqrt[4]{5}e^{\pi i}, \sqrt[4]{5}e^{\frac{3}{2}\pi i} \right\}$
2. $z \in \left\{ \sqrt[5]{12}e^{\frac{1}{10}\pi i}, \sqrt[5]{12}e^{\frac{1}{2}\pi i}, \sqrt[5]{12}e^{\frac{9}{10}\pi i}, \sqrt[5]{12}e^{\frac{13}{10}\pi i}, \sqrt[5]{12}e^{\frac{17}{10}\pi i} \right\}$
3. $z \in \left\{ \sqrt[3]{10}, \sqrt[3]{10}e^{\frac{2}{3}\pi i}, \sqrt[3]{10}e^{\frac{4}{3}\pi i} \right\}$
4. $z \in \left\{ \sqrt{7}e^{\frac{3}{8}\pi i}, \sqrt{7}e^{\frac{11}{8}\pi i} \right\}$
5. $z \in \left\{ \sqrt[5]{8}e^{\frac{1}{10}\pi i}, \sqrt[5]{8}e^{\frac{1}{2}\pi i}, \sqrt[5]{8}e^{\frac{9}{10}\pi i}, \sqrt[5]{8}e^{\frac{13}{10}\pi i}, \sqrt[5]{8}e^{\frac{17}{10}\pi i} \right\}$
6. $z \in \left\{ \sqrt{6}e^{\frac{1}{3}\pi i}, \sqrt{6}e^{\frac{4}{3}\pi i} \right\}$
7. $z \in \left\{ \sqrt[4]{4}e^{\frac{1}{8}\pi i}, \sqrt[4]{4}e^{\frac{5}{8}\pi i}, \sqrt[4]{4}e^{\frac{9}{8}\pi i}, \sqrt[4]{4}e^{\frac{13}{8}\pi i} \right\}$
8. $z \in \left\{ \sqrt[5]{3}e^{\frac{1}{6}\pi i}, \sqrt[5]{3}e^{\frac{17}{30}\pi i}, \sqrt[5]{3}e^{\frac{29}{30}\pi i}, \sqrt[5]{3}e^{\frac{41}{30}\pi i}, \sqrt[5]{3}e^{\frac{53}{30}\pi i} \right\}$
9. $z \in \{0\}$
10. $z \in \left\{ \sqrt[5]{5}e^{\frac{1}{10}\pi i}, \sqrt[5]{5}e^{\frac{1}{2}\pi i}, \sqrt[5]{5}e^{\frac{9}{10}\pi i}, \sqrt[5]{5}e^{\frac{13}{10}\pi i}, \sqrt[5]{5}e^{\frac{17}{10}\pi i} \right\}$
11. $z \in \left\{ \sqrt{10}e^{\frac{1}{4}\pi i}, \sqrt{10}e^{\frac{5}{4}\pi i} \right\}$
12. $z \in \left\{ \sqrt[4]{4}e^{\frac{1}{6}\pi i}, \sqrt[4]{4}e^{\frac{2}{3}\pi i}, \sqrt[4]{4}e^{\frac{7}{6}\pi i}, \sqrt[4]{4}e^{\frac{5}{3}\pi i} \right\}$
13. $z \in \left\{ \sqrt[3]{8}, \sqrt[3]{8}e^{\frac{2}{3}\pi i}, \sqrt[3]{8}e^{\frac{4}{3}\pi i} \right\}$
14. $z \in \left\{ e^{\frac{1}{16}\pi i}, e^{\frac{9}{16}\pi i}, e^{\frac{17}{16}\pi i}, e^{\frac{25}{16}\pi i} \right\}$
15. $z \in \left\{ \sqrt{3}e^{\frac{1}{4}\pi i}, \sqrt{3}e^{\frac{5}{4}\pi i} \right\}$
16. $z \in \left\{ \sqrt{12}e^{\frac{1}{4}\pi i}, \sqrt{12}e^{\frac{5}{4}\pi i} \right\}$
17. $z \in \left\{ \sqrt[4]{3}e^{-\frac{1}{16}\pi i}, \sqrt[4]{3}e^{\frac{7}{16}\pi i}, \sqrt[4]{3}e^{\frac{15}{16}\pi i}, \sqrt[4]{3}e^{\frac{23}{16}\pi i} \right\}$
18. $z \in \left\{ 1, e^{\frac{2}{3}\pi i}, e^{\frac{4}{3}\pi i} \right\}$
19. $z \in \left\{ \sqrt[3]{3}e^{\frac{1}{6}\pi i}, \sqrt[3]{3}e^{\frac{5}{6}\pi i}, \sqrt[3]{3}e^{\frac{3}{2}\pi i} \right\}$
20. $z \in \left\{ \sqrt{2}e^{\frac{1}{4}\pi i}, \sqrt{2}e^{\frac{5}{4}\pi i} \right\}$