1. Efetue as operações indicadas.

   (a) $(-2+i)+(3-5i)+(2-3i)$

   (b) $(2-5i)-(2+3i)-(5-3i)$

   (c) $\left(\frac{3}{2}-\frac{5}{3}i\right)+\left(2-\frac{1}{2}i\right)$

   (d) $(-2-i)\times(3+5i)$

   (e) $\left(\frac{1}{2}-3i\right)\times\left(2+\frac{1}{3}i\right)$

   (f) $(2-3i)^2$

   (g) $(\sqrt{3}-2i)(\sqrt{3}+2i)$

   (h) $\dfrac{2+i}{3-2i}$

   (i) $\dfrac{2-i}{1+i}$

   (j) $\dfrac{3}{\sqrt{2}-i}$

   (k) $\dfrac{1+3i}{1-2i}+\dfrac{i-4}{1+2i}$

   (l) $\dfrac{1+i+\frac{2-i}{1-i}}{2-i}+i$

   (m) $(2-i)(3+2i)-(i-3)^2$

   (n) $\dfrac{2i^{28}-3i^{42}+2i^{19}}{i^5+2i^6}$

2. Escreva os conjugados dos seguintes números complexos.

   (a) $2-5i$

   (b) $i+2$

   (c) $\sqrt{2}-\dfrac{i}{2}$

   (d) 0

   (e) $-\dfrac{2}{3}\sqrt{3}$

   (f) $-\sqrt{5}i$

3. Mostre que são raízes da equação $x^3-6x^2+21x-26=0$ os números complexos $2+3i$ e $2-3i$.

4. Represente na forma trigonométrica os seguintes números complexos.

   (a) $-3i$

   (b) -2

   (c) $-1-i$

   (d) $\dfrac{\sqrt{3}}{2}-\dfrac{i}{2}$

   (e) $-\sqrt{2}+\sqrt{2}i$

5. Represente na forma algébrica os seguintes números complexos.

   (a) $3\,\text{cis}\left(\frac{\pi}{3}\right)$

   (b) $\sqrt{2}\,\text{cis}\,(\pi)$

   (c) $4\,\text{cis}\left(\frac{\pi}{2}\right)$

   (d) $\text{cis}\left(\frac{5\pi}{6}\right)$

6. Calcule, passando para a forma trigonométrica.

   (a) $\left(\dfrac{\sqrt{2}}{2}-\dfrac{\sqrt{2}}{2}i\right)^{20}$

   (b) $\left(\dfrac{\sqrt{3}}{2}-\dfrac{1}{2}i\right)^{30}$

7. Calcule as raízes cúbicas dos seguintes números complexos.

   (a) 1

   (b) -1

   (c) $8i$

   (d) $-i$

8. Considere o complexo $z = \dfrac{6-2i}{1+3i} + 12i$. Determine.
    (a) A componente imaginária.
    (b) O argumento principal.
    (c) O maior dos argumentos das raízes de $\sqrt[6]{z}$ que não excede 2π.
9. Considere os complexos $z_1 = 2+2i$ e $z_2 = -3-4i$.
    (a) Calcule $z_3 = 2z_1 - \overline{z_2}$.
    (b) Passe para a forma trigonometria os complexos $w_1 = 9i$ e $w_2 = -3+3i$.
    (c) Calcule $\dfrac{\sqrt{w_1^3}}{\sqrt{2}w_2}$.
10. Considere os complexos $z_1 = \dfrac{1}{\sqrt{2}} - \dfrac{1}{\sqrt{2}}i$ e $z_2 = \sqrt{2}+\sqrt{2}i$.
    (a) Calcule $z_3 = 6z_1 + 2\overline{z_2}$.
    (b) Escreva na forma trigonométrica o inverso do conjugado de z_3.
    (c) Considere o complexo $w_1 = 27\left(\cos\left(\dfrac{\pi}{6}\right) + i \operatorname{sen}\left(\dfrac{\pi}{6}\right)\right)$.
        i. Calcule $w_2 = \dfrac{w_1}{9}$.
        ii. Determine as raízes da equação em z, $z^3 + w_1 = 0$.
11. Determine Re(z), sendo $z = \dfrac{(1+i)^3 - i^{509}}{1+i} - i$.
12. Mostre que $(1+i)^8 = 16$.
13. Resolva os exercícios 1, 2, 3, 6, 8, 9, 10, 11, 12 e 13 utilizando o Scilab.

Soluções

1. (a) $3-7\,i$
    (b) $-5-5\,i$
    (c) $\dfrac{7}{2} - \dfrac{13}{6}\,i$
    (d) $-1-13\,i$
    (e) $2-\dfrac{35}{6}\,i$
    (f) $-5-12\,i$
    (g) 7
    (h) $\dfrac{4}{13}+\dfrac{7}{13}\,i$
    (i) $\dfrac{1}{2}-\dfrac{3}{2}\,i$
    (j) $\sqrt{2}+i$
    (k) $-\dfrac{7}{5}+\dfrac{14}{5}\,i$
    (l) $\dfrac{7}{10}+\dfrac{21}{10}\,i$
    (m) $7\,i$
    (n) $-\dfrac{12}{5}-\dfrac{1}{5}\,i$
2. (a) $2+5\,i$
    (b) $2-i$
    (c) $\sqrt{2}+\dfrac{i}{2}$
    (d) 0
    (e) $-\dfrac{2}{3}\sqrt{3}$
    (f) $\sqrt{5}i$

3.

4. (a) $3 \text{ cis}\left(\frac{3\pi}{2}\right)$
   (b) $2 \text{ cis}(\pi)$
   (c) $\sqrt{2} \text{ cis}\left(\frac{5\pi}{4}\right)$
   (d) $\text{cis}\left(\frac{11\pi}{6}\right)$
   (e) $2 \text{ cis}\left(\frac{3\pi}{4}\right)$

5. (a) $\frac{3}{2} + \frac{3}{2}\sqrt{3}\, i$
   (b) $-\sqrt{2}$
   (c) $4\, i$
   (d) $-\frac{\sqrt{3}}{2} + \frac{1}{2}\, i$

6. (a) -1
   (b) $-1.$

7. (a) $1; -\frac{1}{2} + \frac{\sqrt{3}}{2}\, i; -\frac{1}{2} - \frac{\sqrt{3}}{2}\, i$
   (b) $-1; \frac{1}{2} + \frac{\sqrt{3}}{2}\, i; \frac{1}{2} - \frac{\sqrt{3}}{2}\, i$
   (c) $-2\, i; \sqrt{3} + i; -\sqrt{3} + i$
   (d) $i; -\frac{\sqrt{3}}{2} - \frac{1}{2}\, i; \frac{\sqrt{3}}{2} - \frac{1}{2}\, i$

8. (a) $10\, i$
   (b) $\frac{\pi}{2}$
   (c) $\frac{21\pi}{12}$

9. (a) 7
   (b) $9 \text{ cis}\left(\frac{\pi}{2}\right); 3\sqrt{2} \text{ cis}\left(\frac{3\pi}{4}\right)$
   (c) $\frac{9}{2}; -\frac{9}{2}$

10. (a) $5\sqrt{2} - 5\sqrt{2}\, i$
   (b) $\frac{1}{10} \text{ cis}\left(\frac{7\pi}{4}\right)$
   (c) i. $3 \text{ cis}\left(\frac{\pi}{6}\right)$
      ii. $3 \text{ cis}\left(\frac{7\pi}{18}\right); 3 \text{ cis}\left(\frac{19\pi}{18}\right); 3 \text{ cis}\left(\frac{31\pi}{18}\right)$

11. $-\frac{1}{2}$

12.