

## Complex numbers

Evaluate each expression

[1]  $\sqrt{-16}$       [2]  $\sqrt{-121}$       [3]  $\sqrt{-12}$       [4]  $\sqrt{-50}$       [5]  $(2+4i)+(-5-i)$

[6]  $(6-2i)-(3+7i)$       [7]  $4(-2+3i)-4(2+4i)$       [8]  $(2+i)(-2-i)$       [9]  $(3-2i)(3+2i)$

[10]  $(-2+3i)(2+4i)$       [11]  $(2+i)^2$       [12]  $(3-2i)^2$       [13]  $\left(\frac{\sqrt{2}}{2}+\frac{\sqrt{2}}{2}i\right)^2$       [14]  $(1+2i)^3$

[15]  $(1+i\sqrt{3})^3$       [16]  $\left(\frac{\sqrt{3}}{2}+\frac{1}{2}i\right)^3$       [17]  $\frac{1+2i}{2-i}$       [18]  $\frac{2-3i}{4-2i}$       [19]  $\frac{1+i}{1-i}$       [20]  $|1+i|$

[21]  $|1+i\sqrt{3}|$       [22]  $\left|\frac{1}{\sqrt{2}}+\frac{1}{\sqrt{2}}i\right|$

[23-28] Solve each equation.

[23]  $x^2+1=0$       [24]  $x^2+2x+5=0$       [25]  $x^2-4x+13=0$

[26]  $x^2+10=0$       [27]  $x^2-2x+26=0$       [28]

[29] If  $f(x)=x^3-x^2+2$ , evaluate  $f(1+i)$       [30] If  $f(x)=x^3-5x^2+9x-5$ , evaluate  $f(2-i)$

Write each number in modulus-argument form

[31]  $3i$       [32]  $1-i$       [33]  $-16$       [34]  $-4i$       [35]  $\frac{1}{\sqrt{2}}+\frac{1}{\sqrt{2}}i$       [36]  $\frac{\sqrt{3}}{2}-\frac{1}{2}i$       [37]  $\frac{1}{2}-\frac{\sqrt{3}}{2}i$

Evaluate.

[38]  $(1-i)^4$       [39]  $\left(\frac{\sqrt{2}}{2}-\frac{\sqrt{2}}{2}i\right)^6$       [40]  $(2-2i\sqrt{3})^4$       [41]  $\left(\frac{\sqrt{3}}{2}-\frac{1}{2}i\right)^6$

[42] Find the two square roots of  $i$ .

[43] Find the three cube roots of  $i$ .

[44] Find the three cube roots of  $-8$ .

[45] Find the four fourth roots of  $-16$ .

[46] Find the three cube roots of  $8$ .

[47] Find the six sixth roots of  $-64$ .

[48] Plot the following point on a polar grid:

$$(1+i)^{-2}, (1+i)^{-1}, 1+i, (1+i)^2, (1+i)^3, (1+i)^4, (1+i)^5, (1+i)^6, (1+i)^7, (1+i)^8$$

