

Feuille d'exercices numéro 2

Déterminants et racines de polynômes

Exercice 1

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|---------------|-----------------------|----------------------------|
| (a) 0 | (g) -17 | (m) 106 |
| (b) $2 + 2i$ | (h) $-2a^2 + 4a + 12$ | (n) $-a^3 + 4a^2 - 2a - 6$ |
| (c) -1 | (i) $7 + 2i$ | (o) $3a^2 - 5a - 11$ |
| (d) $4 - 11i$ | (j) $6 - 30i$ | (p) $abcd$ |
| (e) -2 | (k) $-3 + 4i$ | (q) -60 |
| (f) -39 | (l) 0 | |

Exercice 2

- | | | |
|--------------|---------------|---------------------|
| (a) -5 | (f) 0 | (k) $a^2 - 5a + 1$ |
| (b) 0 | (g) $a + 3$ | (l) $a^2 - 3a - 13$ |
| (c) $2 - ab$ | (h) -4 | (m) $a^2 - 1$ |
| (d) $a - 2$ | (i) $1 + abc$ | (n) 2 |
| (e) -4 | (j) 0 | (o) 0 |

Exercice 3

- | | | | |
|---------------|--------------|--------------|--------------|
| (a) $-5 + 2i$ | (b) $2 + 8i$ | (c) $1 + 7i$ | (d) $2 + 8i$ |
|---------------|--------------|--------------|--------------|

Exercice 4

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|---|---|
| (a) $\begin{cases} z_1 = \sqrt{2} \\ \arg(z_1) = \frac{3\pi}{4} \\ z_2 = 2 \\ \arg(z_2) = -\frac{\pi}{4} \end{cases}$ | $\begin{cases} z_3 = 2 \\ \arg(z_3) = \frac{2\pi}{3} \\ z_4 = 3 \\ \arg(z_4) = \frac{\pi}{2} \end{cases}$ |
|---|---|

(c) $z_1 z_2 = 2\sqrt{2}i$

$z_3^3 = 8$

$\frac{z_2}{z_4^2} = -\frac{\sqrt{2}}{9} + i \frac{\sqrt{2}}{9}$

$\frac{1}{z_3 z_4} = -\frac{\sqrt{3}}{12} + i \frac{1}{12}$

(d) $z_1 = \delta_1^2, |\delta_1| = 2^{1/4} = \sqrt[4]{2}, \arg(\delta_1) = \frac{3\pi}{8}$

$z_2 = \delta_2^2, |\delta_2| = \sqrt{2}, \arg(\delta_2) = -\frac{\pi}{8}$

$z_3 = \delta_3^2, |\delta_3| = \sqrt{2}, \arg(\delta_3) = \frac{\pi}{3}, \delta_3 = \frac{\sqrt{2}}{2} + i \frac{\sqrt{6}}{2}$

$z_4 = \delta_4^2, |\delta_4| = \sqrt{3}, \arg(\delta_4) = \frac{\pi}{4}, \delta_4 = \sqrt{\frac{3}{2}} + i \sqrt{\frac{3}{2}}$

Exercice 5

(a) $2 + i$ et $-2 - i$

(b) $1 - 3i$ et $-1 + 3i$

Exercice 6

(a) $\{2 + i, 3 - 2i\}$

(d) $\left\{-\frac{1}{3}, 2, \frac{7}{2}\right\}$

(g) $\left\{-\frac{3}{2}, 1, \frac{7}{3}\right\}$

(b) $\left\{1 + 2i, \frac{1}{2}i\right\}$

(e) $\left\{-3, \frac{1}{2}, 1\right\}$

(h) $\{-2, 1, -1 - i, 1 + 2i\}$

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

(f) $\left\{-1, i, -\frac{2}{3} + \frac{1}{3}i\right\}$