
Resolução das questões da lista de exercícios de Estatística Aplicada:

01: E

$4 \cdot i^3 + 3 \cdot i^2 + 2 \cdot i + 1 = 4\,(-i) - 3 + 2i + 1 = -2 - 2i$

02: A

$$z = \frac{1+3i}{1-i}$$
$$z = \frac{(1+3i)}{(1-i)}\frac{(1+i)}{(1+i)}$$
$$z = \frac{1+i+3i+3i^2}{(1^2-i^2)}$$
$$z = \frac{-2+4i}{2}$$
$$z = -1+2i$$

03: E

$z = 3 \cdot (\cos 6° + i\,\mathrm{sen}\,6°)$; $u = 5 \cdot (\cos 50° + i\,\mathrm{sen}\,50°)$
$z \cdot u = 3 \cdot (\cos 6° + i\,\mathrm{sen}\,6°) \cdot 5 \cdot (\cos 50° + i\,\mathrm{sen}\,50°)$
$z \cdot u = 3 \cdot 5 \cdot (\cos(6° + 50°) + i\,\mathrm{sen}\,(6° + 50°))$
$z \cdot u = 15 \cdot (\cos(56°) + i\,\mathrm{sen}\,(56°))$

04: A

$$(1+i)^{36} = \left[(1+i)^2\right]^{18} = \left[1+2i+i^2\right]^{18} = (2i)^{18} = 2^{18} \cdot i^{18} = 2^{18} \cdot i^2 = -2^{18}$$

05: A

$$z = 2\cdot(\cos 30° + i\operatorname{sen} 30°)$$
$$z = 2\cdot\left(\frac{\sqrt{3}}{2} + i\cdot\frac{1}{2}\right)$$
$$z = \sqrt{3} + i$$
$$P = \left(\sqrt{3}, 1\right)$$
$$u = z^5 = \left[2\cdot(\cos 30° + i\operatorname{sen} 30°)\right]^5$$
$$u = z^5 = 2^5\cdot(\cos(5\cdot 30°) + i\operatorname{sen}(5\cdot 30°))$$
$$u = 32\cdot(\cos(150°) + i\operatorname{sen}(150°))$$
$$u = 32\cdot\left(-\frac{\sqrt{3}}{2} + i\cdot\frac{1}{2}\right)$$
$$u = -16\sqrt{3} + 16\cdot i$$
$$Q = \left(-16\sqrt{3}, 16\right)$$
$$N = \text{ponto médio de } \overline{PQ}$$
$$N = \left(\frac{\sqrt{3} - 16\sqrt{3}}{2}, \frac{1+16}{2}\right)$$
$$N = \left(\frac{-15\sqrt{3}}{2}, \frac{17}{2}\right)$$

06: E

z = (a – 3) + (b – 5)i
z será um número real não nulo se a parte imaginária for igual a zero e a parte real for diferente de zero.
Parte imaginária de z: b – 5
b – 5 = 0
b = 5.
Parte real diferente de zero: (a – 3) ≠ 0 ⇒ a ≠ 3
O complexo z é real não nulo se a ≠ 3 e b = 5.

07: D

$$\frac{k+i}{1-ki} = \frac{(k+i)}{(1-ki)}\cdot\frac{(1+ki)}{(1+ki)} = \frac{k+k^2\cdot i+i+ki^2}{1-k^2\cdot i^2} = \frac{(k^2+1)i}{1+k^2} = i$$

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08: E

$$z \cdot \bar{z} = (1 + 8i) \cdot (1 - 8i) = 1^2 - (8i)^2 = 1 - 8^2 \cdot i^2 = 1 - 64 \cdot (-1) = 65$$

09: B

$$z = 1 + i$$
$$z^{14} = (1+i)^{14}$$
$$z^{14} = \left[(1+i)^2\right]^7$$
$$z^{14} = \left[1 + 2i + i^2\right]^7$$
$$z^{14} = [2i]^7$$
$$z^{14} = 2^7 \cdot i^7$$
$$z^{14} = 128 \cdot i^4 \cdot i^3$$
$$z^{14} = 128 \cdot (-i)$$
$$z^{14} = -128i$$

10: A

$$z = (1+i) \cdot (3-i) \cdot i$$
$$z = \left(3 - i + 3i - i^2\right) \cdot i$$
$$z = (3 + 2i + 1) \cdot i$$
$$z = (4 + 2i) \cdot i$$
$$z = \left(4i + 2i^2\right)$$
$$z = -2 + 4i$$
$$\bar{z} = -2 - 4i$$