LISTA 9

Página 245

1-) $f(x) = (k^2-9)x^3 + 7x^2 - 5x + 1$

ele quer que o polinômio seja de grau 2, então elimina grau 3

$k^2 - 9 = 0$

$k^2 = 9 \Rightarrow k = \pm\sqrt{9} \Rightarrow k = \pm 3$

2-) $x = -3$ é a raiz

$p(x) = 2x^3 + mx^2 - 5x + 3$

$p(-3) \Rightarrow 2.(-3)^3 + m(-3)^2 - 5.(-3) + 3 = 0$

$\Rightarrow 2.(-27) + 9m + 15 + 3 = 0$

$\Rightarrow -54 + 9m + 18 = 0$

$-36 + 9m = 0$

$9m = 36$

$m = \frac{36}{9} \Rightarrow 4$

3-) determine $A - B$

$p(x) = 0$

$p(2) = -8c$

$p(1) = -3.1^4 + a - 5.1^2 + b - 2 = 0$

$-3 + a - 5 + b - 2 = 0$

$-10 + a + b = 0$

$a + b = 10$

$b = 10 - a$

$p(2) = -3.2^4 + 2^3.a - 0.2^2 + 2b - 2 \rightarrow$

$\Rightarrow -3.16 + 8a - 20 + 2b - 2 = -80$

$\Rightarrow -48 + 8a - 20 - 2 + 2b = -80$

$\Rightarrow -70 + 8a + 2b = -80$

$\Rightarrow 8a + 2b = -80 + 70$

$8a + 2b = -10$

/ /

$8a + 2b = -10$

$8a + 2.(10-a)$

$8a + 20 - 2a = -10$

$6a = -10 - 20$

$6a = -30$

$a = -\frac{30}{6} \Rightarrow \boxed{a = -5}$

$b = 10 - (-5)$

$\boxed{b = 15}$

4-)

a-) $3x + 4 = (a+1)x + 2b$

$\begin{cases} a+1 = 3 \\ 2b = 4 \end{cases}$ $\boxed{\begin{matrix} a = 2 \\ b = 2 \end{matrix}}$

b-)

b-) $\underbrace{a}_{3}x^2 + \underbrace{(a-b)}_{5}.x + \underbrace{(b+6)}_{4} = 3x^2 + 5x + 4$

$\begin{cases} a = 3 \\ (a-b) = 5 \\ (b+6) = 4 \end{cases} \Rightarrow b = 4 - 6 \Rightarrow \boxed{b = -2}$

c-) $\frac{a}{x} + \frac{b}{x-1} = \frac{3x+7}{x^2-x} \Rightarrow \frac{ax - a + bx}{x^2 - x} = \frac{3x+7}{x^2-x}$

$\Rightarrow ax - a + bx = 3x + 7$

$\Rightarrow x(a+b) - a = 3x + 7$

$\begin{cases} a+b = 3 \\ -a = 7 \end{cases} \Rightarrow \boxed{a = -7}$

Pauta Branca

1 1

5-)

a-) $f(x) + G(x)$

$-4x^2 + 6x + 3$

$+ \quad 2x - 1$

$-4x^2 + 8x + 2$

b-) $G(x) - h(x)$

$-4x^2 + 6x + 3$

$-(5x^2 - 3x)$

$-9x^2 + 9x + 3$

(-) $f(x) = G(x) + h(x)$

$-4x^2 + 6x + 3$

$2x - 1$

$4x^2 - 6x - 3$

$-8x^3 + 12x^2 + 6x$

$-8x^3 + 16x^2 \; 0 \; -3$

$+ \quad 5x^2 - 3x$

$-8x^3 + 21x^2 - 3x - 3$ //

ou

$(-4x^2 + 6x + 3)(2x - 1)$

$\Rightarrow -8x^3 + 12x^2 + 6x + 4x^2 - 6x - 3$

$\Rightarrow -8x^3 + 16x^2 - 3$

$-8x^3 + 16x^2 + 0 - 3$

$+ \quad 5x^2 - 3x$

$-8x^3 + 21x^2 - 3x - 3$

6) Pagina 247

1-) a-) $-14x^2 + 3x - 5 \;|\; 7x + 2$

$+ 14x^2 + 4x \quad -2x + 1$

$0 + 7x - 5$

$-7x - 2$

-7

$q(x) = -2x + 1$

$r(x) = -7$

b-) $x^3 - x^2 - 5x + 1 \;|\; x^2 - 3x$

$-x^3 + 3x^2 \quad x + 2$

$0 + 2x^2 - 5x + 1$

$-2x^2 + 6x$

$0 + x + 1$

$q(x) = x + 2$

$r(x) = x + 1$

Paula Branca

1 1

(-) $x^4 + x^3 - x^2 + 1 \mid x^2 - 2$

$-x^4 + 2x^2 \qquad x^2 + x + 1$

$0 + x^3 + x^2 + 1$

$-x^3 + 2x$

$x^2 + 2x + 1$

$-x^2 + 2$

$0 + 2x + 3$

d-) $6x^5 - 2x^4 + 3x^3 - 5x^2 + x - 3 \mid 3x^3 - 4x^2 + x - 1$

$-6x^5 + 8x^4 - 2x^3 + 2x^2 \qquad 2x^2 + 2x + 3$

$0 + 6x^4 + x^3 - 3x^2 + x - 3$

$-6x^4 + 8x^3 - 2x^2 + 2x$

$0 + 9x^3 - 5x^2 + 3x - 3$

$-9x^3 + 12x^2 - 3x + 3$

$0 + 7x^2 - 1x$

2-) $p(x) \mid x^2 + x - 3$

$3x + 5$

$r(x) = -2x + 3$

para descobrir $p(x)$ use:

$$f(x) = g(x) \cdot q(x) + r(x)$$

$p(x) = (x^2 + x - 3)(3x + 5)$

$= 3x^3 + 8x^2 - 4x - 15$

$+ \qquad -2x + 3$

$3x^3 + 8x^2 - 6x - 12$

agora vamos descobrir $p(2)$

$p(2) = 3 \cdot 2^3 + 8 \cdot 2^2 - 6 \cdot 2 - 12$

$= 3 \cdot 8 + 32 - 12 - 12$

$= 24 + 32 - 24$

$= 32$

3-) $1x^2 - 2x + c$

$-1x^2 + 16x$

$1x + a$

$-1x + 6$

$6 + a$

Pagina 251

1-) a-) $(x-1)^2$

$x^2 - 3x + 1$

$-x^2 + 3x$

$0 - 5x + 16$

$-5x - 15$

b-) $x^4 - 3x^2 + 5x - 1$

$x + 1 = 0$ | $(-1)^4$

$x = -1$ | 1

Teorema

3-) $4x^2 - 2x + a$ | $2x - 3$ | $2x + 2$

$-4x^2 + 6x$

$4x + a$

$-4x + 6$

$6 + a$

$a + 6 = 0$

$a = -6$

Pagina 251

4-) a-) $(x-1)^2$

$x^2 - 3x + 16$ | $x - 3$ | $x - 5$

$-x^2 + 3x$

$0 - 5x + 16$

$-5x + 15$

1

$x - 3 = 0$

$x = 3$

$3^2 - 8.3 + 16$

$9 - 24 + 16 = 1$

b-) $x^4 - 3x^2 + 5x - 1$ | $x + 1$ | $x + 1$

$x + 1 = 0$

$x = -1$

$(-1)^4 - 3.(-1)^2 + 5.(-1) - 1$

$1 - 3 - 5 - 1$

-8

Teorema

Resto

1 1

2-)

a-) $g(x) = x + 4$

$x = -4$

$f(-4) = 4.(-4)^2 - 3.(-4) + m$

$64 + 12 + m$

$76 + m = 0$

$m = -76$

b-) $g(x) = x + 2$

$x = -2$

$f(-2) = -(-2)^3 + m(-2)^2 - 5.(-2) + 2$

$= 8 + 4m + 10 + 2$

$4m + 20 = 0$

$m = \frac{20}{4} = 5$

3-) $x + 5 = 0$

$x = -5$

$2(-5)^3 + (-5)^2 + m(-5) - 3 = -53$

$-228 - 5m = -53$

$-5m = -53 + 228$

$-5m = +175 \cdot (-1)$

$5m = -175$

$m = \frac{-175}{5} = -35$

4-)

Paula Dranca

Slide 254 — Briot-Ruffini

a-) $g(x) = x + 4 \Rightarrow x = -4$

-4	2	-1	1	-3
	2	-9	37	-151

$f(x) = 2x^2 - 9x + 37$

$r(x) = -151$

b-) $g(x) = x - 1 \Rightarrow x = 1$

1	-1	5	0	2	1
	-1	4	4	2	3

$f(x) = -x^3 + 4x^2 + 4x + 2$

$r(x) = 3$

c-) $g(x) = x - \frac{1}{2} \Rightarrow x = \frac{1}{2}$

$\frac{1}{2}$	12	-8	5	2	
	12	-2	4	4	r=d

$f(x) = 12x^2 - 2x + 4$

$R(x) = 4$

Slide 257 — Numeros Complexos

a-) $x^2 + 4 = 0$

$D = -16$

$x = \frac{0 \pm \sqrt{-16}}{2}$

$x = \frac{0 \pm \sqrt{16} \cdot \sqrt{-1}}{2}$

$x = \frac{4 \cdot i}{2}$

$x_1 = \frac{4i}{2} = 2i$

$x_2 = \frac{-4i}{2} = -2i$

1 1

b-) $x^2 - 4x + 29 = 0$

$\Delta = (-4)^2 - 4 \cdot 1 \cdot 29$

$\Delta = 16 - 100$

$x = \frac{4 \pm \sqrt{100}}{2}$

$x = \frac{4 \pm \sqrt{100} \cdot \sqrt{-1}}{2}$

$x = \frac{4 \pm 10i}{2}$

$x_1 = 2 + 5i$

$x_2 = 2 - 5i$

c-) $x^2 - 6x + 10 = 0$

$\Delta = -4$

$x = \frac{6 \pm \sqrt{-4}}{2}$

$x = \frac{6 \pm \sqrt{4} \cdot \sqrt{-1}}{2}$

$x = \frac{6 \pm 2i}{2}$

$x_1 = 3 + i$ e $x_2 = 3 - i$

Exercício Slide 269

1-)

a-) $x^2 - 8x + 25$

$\Delta = -36$

$x_1 = 4 + 3i$

$x_2 = 4 - 3i$

$(x - 4 + 3i)(x - 4 - 3i)$

b-) $x^3 + x^2 - 2x = 0$

$x(x^2 + x - 2) = 0$

$x = 0$ ou $x^2 + x - 2 = 0$

$x^2 + x - 2 = 0$

$\Delta = 9$ $x_1 = 1$ $x_2 = -2$

$S = \{-2, 0, 1\}$

$f(x) = (x+2)(x-1)(x)$

Paula Branco

2-) $P(x) = x^4 + x^3 - 7x^2 - x + 6 = 0$

1	1	1	-7	-1	6
2	1	2	-5	-6	0
	1	4	3	0	

$x^2 + 4x + 3 = 0$

$\Delta = 4$

$x_1 = -1 \quad x_2 = -3$

3-) $(x-(-1))(x-(-1))$

$(x+1)(x+1)$

$(x+1)^2$

$3(-1)^3 + 5(-1)^2 + (-1) + m$

$-3 + 5 + 1 + m$

$5 - 4 + m = 0$

$1 + m = 0$

$m = -1$ //

-1	3	5	1	-1
-2	3	2	-1	0
	3	-1	0	

$3x - 1 = 0$

$3x = 1$

$x = \frac{1}{3}$

Exercício slide 276

1-) $P(x) = 2x^2 + 6 + 1 = 0$

a-) $r + s = \frac{-6}{2} = -3$

b-) $r \cdot s = \frac{1}{2}$

d-) $r^2 + s^2 = 1$

$(r+s)^2 = (-3)^2$

$r^2 + 2rs + s^2 = 9$

$r^2 + 2 \cdot \left(\frac{1}{2}\right) + s^2$

$r^2 + 1 + s^2 = 9$

$r^2 + s^2 = 9 - 1 \Rightarrow 8$ //

c-) $\frac{1}{r} + \frac{1}{s} = \frac{s+r}{r \cdot s} = \frac{-3}{\left(\frac{1}{2}\right)} = -3 \cdot \frac{2}{1} = -6$

1/1

2-) $x^3 - 2x^2 + x + 4 = 0$

a-) $r+s+t = \frac{+2}{1} = \frac{-b}{a}$

b-) $(r \cdot s) + (r \cdot T) + (s \cdot T) = \frac{c}{a} = 1$

c-) $r \cdot s \cdot t = \frac{-d}{a} = \frac{-4}{1} = -4$

d-) $\frac{1}{r} + \frac{1}{s} + \frac{1}{t} = \frac{st + rs + rt}{rst} = \frac{1}{-4} = -\frac{1}{4}$

3-) $r \cdot s = -6 = \frac{c}{a}$ $\quad r+s+t = 2 = \frac{-b}{a}$

$r \cdot s \cdot T = -6$ $\quad r+s = 1$

$T = 1$ $\quad r = 3$

$s = -2$

Slide 280

a-) $x^3 - 7x^2 + 7x + 15 = 0$

divisores de $15 = \{\pm 3, \pm 5\}$
divisores de $1 = \{\pm 1\}$

$f(1) = 16$
$f(-1) = 0$ $\quad S = \{3, -1, 5\}$
$f(3) = 0$
$f(-3) = -96$
$f(5) = 0$
$f(-5) = 220$

c-) $x^3 + 2x^2 - 1$

raiz

	1	2	0	-1
-1		1	1	-1
	1	1	-1	0

divisores de $-1 = \{\pm 1\}$ //
// $1 = \{\pm 1\}$

$\Delta = 5$

$x = \frac{-1 \pm \sqrt{5}}{2}$

$f(1) = 2$
$f(-1) = 0$

d-) $x^3 + 2x^2 - 5x + 2 = 0$

$\Delta = 17$

$x1 = \frac{-3 \pm \sqrt{17}}{2}$

$2 = \{\pm 2, \pm 1\}$
$1 = \{\pm 1\}$

$f(1) = 0$
$f(-1) = 8$
$f(2) = 8$
$f(-2) = 12$

	1	2	-5	2
1		1	3	-2
	1	3	-2	0

$x^2 + 3x - 2$

Paula Dranca