Chapter 3

Hon Pre-Calc

Quiz - Solve Polynomial

Name _____

Show all work!!! Circle ALL final answers!!! ~~Scientific calculator allowed!!!~~

Short Answer

1. Given: $f(x) = 3x^7 - 26x^6 + 91x^5 - 164x^4 + 154x^3 - 52x^2 - 24x + 16$, and $f(1+i) = 0$

   a) Determine the number(s) of positive, negative, and imaginary zeros

Positive	Negative	Imaginary

   b) List all possible rational zeros

   c) Solve completely

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Short Answer

1. Given: $f(x) = 3x^7 - 26x^6 + 91x^5 - 164x^4 + 154x^3 - 52x^2 - 24x + 16$, and $f(1+i) = 0$

a) Determine the number(s) of positive, negative, and imaginary zeros

Positive	Negative	Imaginary
6	1	0
4	1	2
2	1	4
0	1	6

★

b) List all possible rational zeros

$\frac{1, 2, 4, 8, 16}{1, 3} \Rightarrow \pm\left\{1, 2, 4, 8, 16, \frac{1}{3}, \frac{2}{3}, \frac{4}{3}, \frac{8}{3}, \frac{16}{3}\right\}$

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c) Solve completely

$x = 1+i, 1-i, 2 \text{ mult. } 2, \frac{2}{3}, 1-\sqrt{2}, 1+\sqrt{2}$

$(x-(1+i))(x-(1-i))$

$((x-1)-i)((x-1)+i)$

$x^2 - 2x + 1 + 1 = x^2 - 2x + 2$

$$x^2-2x+2 \overline{)\,3x^7 - 26x^6 + 91x^5 - 164x^4 + 154x^3 - 52x^2 - 24x + 16}$$

$3x^5 - 20x^4 + 45x^3 - 34x^2 - 4x + 8$

$-3x^7 + 6x^6 \mp 6x^5$

$-20x^6 + 85x^5 - 164x^4$

$+20x^6 \mp 40x^5 + 40x^4$

$45x^5 - 124x^4 + 154x^3$

$-45x^5 + 90x^4 \mp 90x^3$

$-34x^4 + 64x^3 - 52x^2$

$+34x^4 \mp 68x^3 + 68x^2$

$-4x^3 + 16x^2 - 24x$

$+4x^3 \mp 8x^2 + 8x$

$-16x + 16$

$\mp 16x \pm 16$

0

$x = 1+i, 1-i, 2 \text{ mult. } 2, \frac{2}{3}, 1-\sqrt{2}, 1+\sqrt{2}$

$3x^5 - 20x^4 + 45x^3 - 34x^2 - 4x + 8$

$\pm\left\{1, 2, 4, 8, 16, \frac{1}{3}, \frac{2}{3}, \frac{4}{3}, \frac{8}{3}, \frac{16}{3}\right\}$

-2	3	-20	45	-34	-4	8
		-6	-28	34	0	-8
-2	3	-14	17	0	-4	0
		-6	-16	2	4	
$\frac{2}{3}$	3	-8	1	2	0	
		2	-4	-2		
	3	-6	-3	0		

$\pm(1, 2, \frac{1}{3}, \frac{2}{3})$

P	N	Z
6	1	0
4	1	2
2	1	4
0	1	6

$3x^2 - 6x - 3 = 0$

$x^2 - 2x - 1 = 0$

$x = \frac{2 \pm \sqrt{(-2)^2 - 4(1)(-1)}}{2(1)}$

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

$x = \frac{2 \pm \sqrt{8}}{2} = 1 \pm \frac{\sqrt{8}}{2}$

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

$1 \pm \sqrt{2}$

$x = \frac{6 \pm \sqrt{(-6)^2 - 4(3)(-3)}}{2(3)}$

$x = \frac{6 \pm \sqrt{36 + 36}}{6}$

$x = 1 \pm \frac{\sqrt{72}}{6} = 1 \pm \frac{6\sqrt{2}}{6} = 1 \pm \sqrt{2}$