

MATH 1210 Problem Workshop 4

1. Find the remainder when the first polynomial is divided by the second.

(a) $x^4 + (3 + i)x^3 - 2ix + 5$, $x - 4i$

(b) $x^3 - 2x^2 + 3x + 6$, $3x + 2$

2. If $3 - 2i$ is a zero of the polynomial $3x^3 - 17x^2 + 33x + 13$, what are its other zeros?
3. What are the values of h and k if the remainders are $298/81$ and 141 when

$$4x^4 + hx^3 - 3x^2 + kx + 5$$

is divided by $3x + 1$ and $x - 2$ respectively.?

In each of the following questions use the rational root theorem to list all the possible rational zeros of the polynomial, then find all roots of the polynomial.

4. $P(x) = 2x^4 - 13x^3 + 24x^2 - 9x$
5. $P(x) = 3x^4 - 10x^3 - 20x^2 - 23x - 10$
6. $P(x) = 12x^4 - 11x^3 + 50x^2 - 44x + 8$
7. $P(x) = 2x^5 - x^4 + 2x - 1$

Answers

1. (a) $333 - 192i$
(b) $76/27$
2. $3 + 2i$, and $-1/3$.
3. $h = 10, k = 2$.
4. (a) $\pm 1, \pm 3, \pm 9, \pm 1/2, \pm 3/2, \pm 9/2, \pm 9$
(b) $0, 1/2, 3$ (with multiplicity 2)
5. (a) $\pm 1, \pm 2, \pm 5, \pm 1/3, \pm 2/3, \pm 5/3, \pm 10/3, \pm 5, \pm 10$
(b) $-2/3, 5, -1/2 \pm \sqrt{3}i/2$
6. (a) $1, 2, 4, 1/2, 1/3, 2/3, 4/3, 8/3, 1/4, 1/6, 1/12$
(b) $1/4, 2/3, \pm 2i$
7. (a) $\pm 1, \pm 1/2$
(b) $1/2, (\pm 1 \pm i)/\sqrt{2}$