MATH 1210 A01 Summer 2013 Problem Workshop 4

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

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

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

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) $1/2, (\pm 1 \pm i)/\sqrt{2}$