

Mth 30, Homework 6 on sections 3.5, 3.6

Due by Wed, Mar 13.

Please use lots of space and explain your answers, showing clearly any work you had to do. Each question is worth 3 points and the last one is worth 7.

- (1) Use long division (not synthetic division) to divide $2x^3 - 5x^2 + 5x - 3$ by $2x + 1$. Identify the quotient and the remainder.
(Hint: You should get a remainder of -7 .)
- (2) Divide $4x^3 + 10x^2 - 5x - 6$ by $x + 3$. Give the quotient and the remainder. (Synthetic division is recommended - you should have $k = -3$.)
- (3) Divide $f(x) = 3x^4 - 6x^3 - 5x + 10$ by $x - 2$. Is $x - 2$ a factor of $f(x)$?
(If using synthetic division, add a 0 for the missing power of x .)
- (4) Let $g(x) = 2x^3 - 9x^2 - 3x + 8$. Evaluate $g(5)$ in two ways: first by substituting 5 into the formula, and secondly using synthetic division (with $k = 5$) to get the answer as a remainder. Make sure you get the same answer both ways!
(This is using the Remainder Theorem which says that if you divide $g(x)$ by $x - k$ then the remainder is $g(k)$.)
- (5) Factor the polynomial $2x^3 + 7x^2 - 46x + 21$ completely by using that one factor is $x - 3$.
(Hint: Use synthetic division and then factor the quotient.)
- (6) Suppose you know that $f(17) = 0$ for a certain polynomial $f(x)$. Can you say anything about the factors of $f(x)$?
(Remember the Factor Theorem.)
- (7) List the possible rational zeros of $3x^5 + 17x^4 - 19x + 4$ according to the theorem - no need to check if any are actual zeros.
- (8) (7 points) For the polynomial $f(x) = 2x^3 + x^2 - 7x - 6$,
 - (a) List all possible rational zeros. (You should find 12 possibilities.)
 - (b) Start testing to find one that is an actual zero by using synthetic division and looking for zero remainders.
 - (c) When you find an actual zero $x = k$, use the quotient and $(x - k)$ to factor $f(x)$. Then factor the quotient (it might need the *ac* method).
 - (d) Use the complete factorization of $f(x)$ to give all of its zeros.

If you get stuck on a question or aren't sure if you understand it:

- Go over the relevant class notes and section in the textbook.
- Check if you get the right answer for a similar odd-numbered question in the textbook (answers at the back of the book).
- Ask me about it after class.
- Come to my office hours: Mon 12:00 - 1:00, Wed 12:00 - 1:00 in CP 317.
- Go to the Math Tutorial Lab in-person in CP 303 or online.