

Mth 30, Homework 5 on sections 3.3, 3.4, 3.5

Due by Wed, Mar 4.

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

Section 3.3 Power Functions and Polynomial Functions

- (1) For the power function $f(x) = -2x^3$,
- (a) Compute $f(10)$ and $f(100)$, showing the behavior going right.
 - (b) Compute $f(-10)$ and $f(-100)$, showing the behavior going left.
- (2) For the same $f(x) = -2x^3$, fill in the blanks describing its end behavior:
- (a) As $x \rightarrow \infty$, $f(x) \rightarrow \underline{\hspace{2cm}}$.
 - (b) As $x \rightarrow -\infty$, $f(x) \rightarrow \underline{\hspace{2cm}}$.

(Hint: your answers here should be ∞ or $-\infty$ and should match the previous question.)

- (3) For the polynomial $3x^6 - 4x^4 + 7x^2 + x - 13$ find:
- (a) its degree,
 - (b) its leading term,
 - (c) its leading coefficient.
- (4) Give the end behavior of $g(x) = 12x^4 - 4x + 7$ by drawing the arrows that show the direction of the graph going left and right.

Section 3.4 Graphs of Polynomial Functions

- (5) Find the x and y intercepts and end behavior of $f(x) = -2x(x-2)(x+5)$ and use this information to carefully sketch its graph. Make sure to label and number the axes.
(Hint: there are three x intercepts.)
- (6) Find the x intercepts of $h(x) = 2x^4 - 8x^3 + 6x^2$
(Hint: to factor $h(x)$ take out the gcd first)
- (7) Find the zeros of $f(x) = x^3 + 2x^2 - 9x - 18$
(Hint: The zeros are just another name for the x intercepts. Factor by grouping.)

- (8) For $g(x) = (2x + 1)^3(9x^2 - 6x + 1)$ use factoring to explain why its zeros are just $-1/2$ and $1/3$ and give their multiplicities.
- (9) Sketch the graph of $h(x) = (x + 3)^2(x - 2)$ after finding its end behavior, intercepts and multiplicities of zeros. Make sure to label and number the axes.
- (Remember that if the multiplicity is even then the graph does not cross the x -axis there.)
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Section 3.5 Dividing Polynomials

- (10) 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 .)
- (11) Divide $4x^3 + 10x^2 - 5x - 6$ by $x + 3$. Give the quotient and the remainder.
- (Synthetic division is recommended - you should have $k = -3$.)
- (12) Let $f(x) = 3x^4 - 6x^3 - 5x + 10$
- (a) Divide $f(x)$ by $x - 2$.
- (If using synthetic division, add a 0 for the missing power of x .)
- (b) Is $x - 2$ a factor of $f(x)$?
- (13) 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 $g(k)$.)
- (14) 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.)
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If you're stuck on a question:

- Ask me about it after class.
- Come to my office hours: Mon 4:30 - 5:30, Wed 4:30 - 5:30 in CP 317.
- Go to the Math Tutorial Lab in person in CP 303 or online.