

AP Precalculus
Polynomial Degree, Zeros, and End Behavior

Polynomial Degree, Zeros, and End Behavior | APPC-COMB-U01-P04-P06

96 problems · Four activity formats

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Topic focus

Across 96 tasks this topic asks for left/right signs and oriented behavior, dominant term and both tails by case, decision with structural reason, qualified local relative-size conclusion, justified eventual comparison and qualified zero-set and equality conclusion.

8 PDFs and a README; 88 buyer pages.

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Name: _____ Date: _____ Class: _____

Answer each question and record the matching bank letter. Give exact values. Give the whole requested response, including any reasoning the question asks for.

For $P(x) = 4x^3 - 4x^3 + 7 - 7$, determine the actual degree, leading term, and leading coefficient. Simplify only as much as needed and handle any constant or zero exception.

On the stated domain, the rule is $f(x) = x^4 + \frac{3}{x}$. Does it define a polynomial function? Simplify if useful and justify from coefficient, exponent, and domain structure.

Bank label: _____

Bank label: _____

For $f(x) = -x^6 + 5x^5 + 18$ and $g(x) = -x^6 - 17$, compare the requested difference after leading cancellation. Distinguish signed tail direction from eventual absolute magnitude and inspect cancellation when relevant.



For $P_p(x) = (p - 1)x^4 - 2x^3 + 17$, describe both tails for $p > 1$, $p < 1$, and $p = 1$. Recompute degree at cancellation rather than assigning a zero leading coefficient.

Bank label: _____

Bank label: _____

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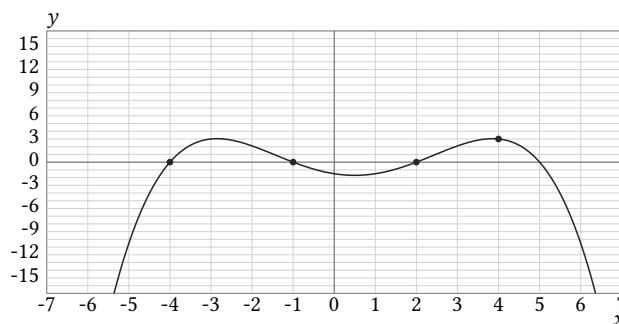
Answer each question and show your reasoning in the workspace. Give exact values rather than decimals unless the question supplies a decimal. Give the whole requested response, including any reasoning the question asks for.

For the polynomial $f(x) = x^6 + 2x^5 + 18$, describe both end behaviors. State the x -direction and output direction for each tail, and justify from the leading structure.

On the stated domain, the rule is $f(x) = \sqrt{2}x^1 - 2x + 11$. Does it define a polynomial function? Simplify if useful and justify from coefficient, exponent, and domain structure.

For $P(x) = (4x^3 + 1)(3x + 1)(-x + 1)$, determine the actual degree, leading term, and leading coefficient. Simplify only as much as needed and handle any constant or zero exception.

A continuous polynomial graph uses one unit per tick and includes exact visible points $(-4, 0)$, $(-1, 0)$, $(2, 0)$, $(4, 3)$. Its certified arrows state $y \rightarrow -\infty$ as $x \rightarrow -\infty$ and $y \rightarrow -\infty$ as $x \rightarrow +\infty$. Infer the necessary degree parity and leading-coefficient sign. Does this identify a unique degree?



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Name: _____ Date: _____ Class: _____

Begin at START. Answer the card, then find the matching final answer at the top of another card. Use the recording sheet for your reasoning. Visit each card once and continue to FINISH.

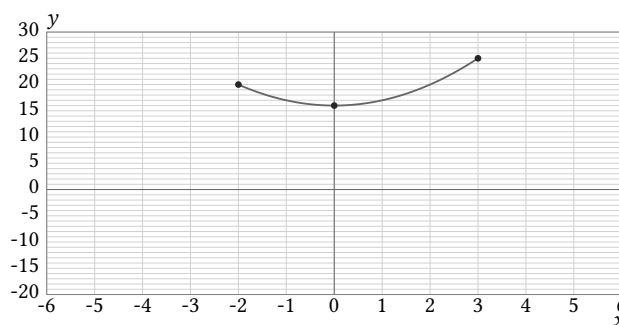
START

For $P(x) = 5x^5 - 5x^5 - 2x^3 + 11$, determine the actual degree, leading term, and leading coefficient. Simplify only as much as needed and handle any constant or zero exception.

Your response: _____

Incoming: Degree 3; leading term $-2x^3$; leading coefficient -2 .

An exact polynomial graph uses rule $x^2 + 16$, one unit per tick, domain $[-2, 3]$, supplied feature points $(-2, 20)$, $(0, 16)$, $(3, 25)$, and certified behavior: no full-domain tails are asserted. Determine which absolute extrema are justified on the stated domain; distinguish local from global evidence.



Your response: _____

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and End Behavior****Name:** _____ **Date:** _____ **Class:** _____

Evaluate the supplied statement or method. Say whether it is correct, repair it if it is not, and verify the result exactly. Not every prompt contains an error.

Construct one polynomial of minimum allowed degree at least 2, with even degree, positive leading coefficient, and constant term 1. Give a formula and verify both tails. A student writes only the final conclusion and omits the substitution, algebra, domain check, or justification required by the prompt. Diagnose the incomplete reasoning and supply the missing work.

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Full Worked Solutions - excerpt

Worked example

Problem. For $P(x) = 5x^5 - 5x^5 - 2x^3 + 11$, determine the actual degree, leading term, and leading coefficient. Simplify only as much as needed and handle any constant or zero exception.

Answer. Degree 3; leading term $-2x^3$; leading coefficient -2 .

Explanation and check.

After the needed combining or leading-factor multiplication, the highest surviving power is 3 with coefficient -2 .

Worked example

Problem. For $P(x) = 4x^3 - 4x^3 + 7 - 7$, determine the actual degree, leading term, and leading coefficient. Simplify only as much as needed and handle any constant or zero exception.

Answer. The result is the zero polynomial, whose ordinary degree and leading coefficient are undefined.

Explanation and check.

All terms cancel. The zero polynomial has no highest nonzero power, so it has no ordinary degree or leading coefficient.