Precalculus Unit 1 worksheet: Degree, end behavior and the shape of a polynomial graph

Name _____ Date _____ Period _____

1. Collect like terms where needed, then give the leading term of each polynomial and describe its end behavior in arrow notation.

(a) $p(x) = 7 + 2x^2 - 6x^3$

(b) $p(x) = x^3(4 - x)^2 - x^5$

(c) $p(x) = (2x + 1)^3 - 8x^3$

(d) $p(x) = 9 - x^4 + \frac{1}{2}x^5$

2. Let $p(x) = 4(x - 3)^2(4 - x)(x^2 + 1)$.

(a) Find the degree and the leading term of p.

(b) Describe the end behavior of p in arrow notation.

(c) Find the y-intercept of the graph of p.

(d) At most how many turning points can the graph of p have?

3. Decide whether a polynomial with the description exists. If it does, write one. If it does not, say which fact about polynomials rules it out.

(a) Degree 5, with 6 real zeros.

(b) Degree 3, with no turning points.

(c) Degree 4, with every real number as an output.

(d) Degree 6, with no real zeros and both ends falling.

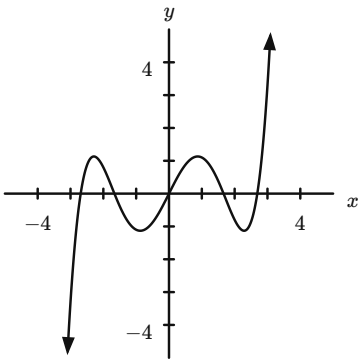
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4. A point where two graphs meet is a solution of the equation that sets the two rules equal.

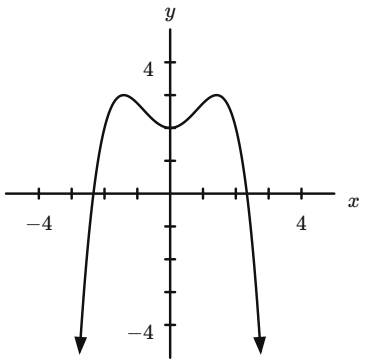
(a) At most how many points can the graphs of $y = 2x^5 - x^2 + 3$ and $y = 2x^5 + 4x - 1$ have in common? Find the x-coordinate of each one.

(b) Two different cubic polynomials f and g have the same leading coefficient. At most how many points can their graphs share? Explain.

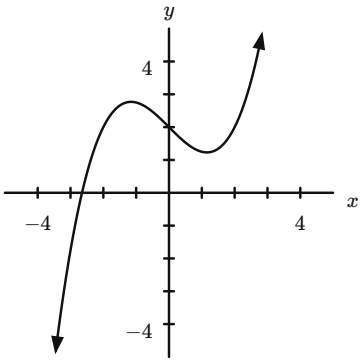
5. Each graph A to D is the graph of one of these polynomials. Match each graph with its polynomial, and give a reason for each match that uses the end behavior and the number of turning points.



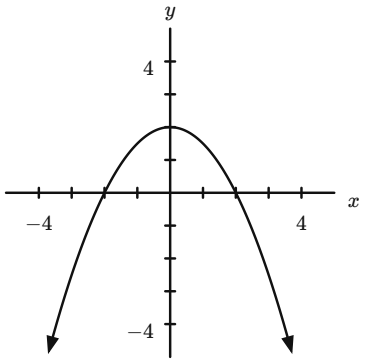
A



B



C

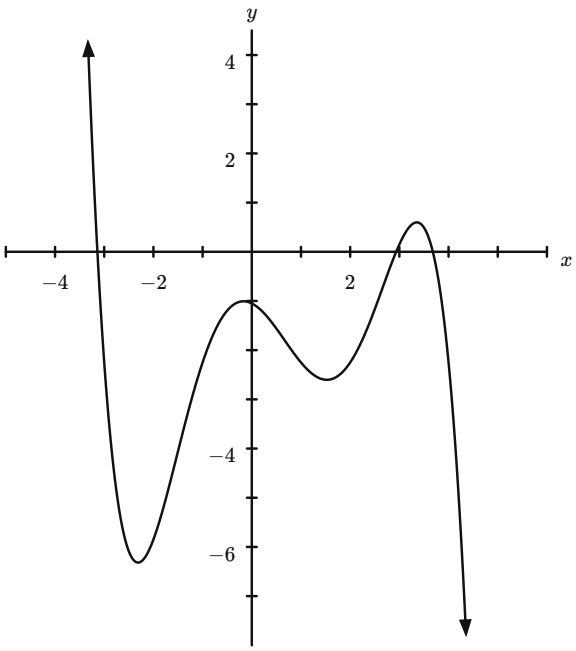


D

(1) $y = 2 + x^2 - \frac{1}{4}x^4$ (2) $y = \frac{1}{4}x^3 - x + 2$ (3) $y = 2 - \frac{1}{2}x^2$ (4) $y = \frac{1}{10}x^5 - x^3 + 2x$

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6. The graph of a polynomial p is shown. Apart from its two ends, which go on in the directions of the arrows, the whole graph is in view.



(a) For each of the degrees 3, 4, 5, 6 and 7, say whether p could have that degree, and give the reason.

(b) What is the sign of the leading coefficient of p?

(c) Counting the x-intercepts alone, what least degree would you get? Explain why the turning points give a stronger bound for this graph.

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