

Divide using **long** division.

1. $(27x^3 + 9x^2 - 3x - 9) \div (3x - 2)$

2. $(4x^4 - 8x^3 + 11x^2 + 18x - 45) \div (2x - 3)$

Use synthetic division **and** substitution to find the indicated value of the function. **SHOW ALL WORK**

3. $P(x) = -3x^4 + 5x^3 - x + 7$; find $P(-2)$

4. $P(x) = 4x^3 - 12x - 2$; find $P(5)$

Use synthetic division to determine if each binomial is a factor of the given polynomial. If so, **completely factor** the polynomial. Show all work.

5. Binomial: $x + 4$
Polynomial: $x^3 - 13x + 12$

6. Binomial: $x - 2$
Polynomial: $x^3 - 6x^2 - 9x + 14$

For each equation, ① state the number of complex roots,
 ② the possible number of real roots,
 ③ list all of the possible rational roots,
 ④ describe the end behaviors,
 ⑤ state the maximum number of turns, and
 ⑥ list the possible number of turns.

7. $P(x) = -4x^4 - 5x^2 + 3x^5 + 15$

8. $P(x) = 2x^4 + x^2 - x + 6$

① # c.r. _____

① # c.r. _____

② # p. real r. _____

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③ P rat r. _____

③ P rat r. _____

④ end behavior _____

④ end behavior _____

⑤ max. # turns _____

⑤ max. # turns _____

⑥ possible # turns _____

⑥ possible # turns _____

Find **all** the zeros of each function.

9. $P(x) = x^3 - 4x^2 + 8$

10. $P(x) = x^4 - 7x^2 + 12$

Find **all** the zeros of each function.

11. $P(x) = 6x^3 + x^2 - x$

12. $P(x) = 2x^3 + x^2 - 22x + 24$

13. $P(x) = x^4 - 3x^3 - x^2 - 9x - 12$

14. $P(x) = -4x^3 + 100x$

Write a polynomial **function**, P , in factored form and in standard form by using the given information.

15. P is quartic; zeros: $-3, 1, \sqrt{5}$ End behavior FALL/FALL

15. _____
FACTORED FORM

STANDARD FORM

16. P is cubic function with roots at $x = -5$ and $4i$, end behavior is FALL/RISE.

16. _____
FACTORED FORM

STANDARD FORM