

1. Draw a rough sketch of the graph, given roots at $x = -4$ double root, $2, 3$; $a < 0$.

Use synthetic division to divide.

$$2. \frac{2x^3 - 19x^2 + 38x + 24}{x - 4}$$

Use long division to divide.

$$3. \frac{x^4 + 9x^3 - 5x^2 - 36x + 4}{x^2 - 4}$$

4-5. Remainder and Factor Theorem

- Determine the value of the function, $f(x)$, at the given value.
- Is the number a root of the function?

4. $f(x) = x^4 - 13x^2 - 12x$, $x = -1$

5. $f(x) = x^3 - 3x^2 - 6x + 8$, $x = -2$

Find the roots/zeros of the following polynomials by factoring or synthetic division. If there are imaginary roots, find them as well. State if the roots are rational, irrational, or imaginary. Then graph the polynomial and be sure to list the following: the end behavior of the graph, relative max/min, absolute max/min, y-intercept, increasing/decreasing intervals.

6. $f(x) = -4x^3 + 4x^2 + 15x$

7. $g(x) = x^4 - 4x^2$

8. $f(x) = x^4 + 6x^3 - x^2 - 54x - 72$

9. $f(x) = 2x^3 + 13x^2 - 13x + 3$

10. $f(x) = x^3 - 3x^2 + 8x - 24$

11. $f(x) = x^4 - 3x^2 + 2$

12. $f(x) = 2x^3 + x^2 - 25x + 12$

13. $y = x^3 - x^2 - 8x + 12$

14. $f(x) = x^4 - 3x^3 - 11x^2 + 3x + 10$

15. $y = x^3 + 4x^2 - 2x + 15$

Find all the irrational zeros of the function using a graphing calculator. State if the roots are rational, irrational, or imaginary. Then graph the polynomial and be sure to list the following: the end behavior of the graph, relative max/min, absolute max/min, y-intercept, increasing/decreasing intervals.

16. $f(x) = -2x^3 + 5x^2 + 9x - 8$

17. $f(x) = -x^4 + 3x^3 - x + 6$

18. Use the graph to answer the following.

- Roots:
- Relative Min:
- Relative Max:
- Absolute Max:
- Absolute Min:
- Increasing:
- Decreasing:

