

Target 2A: Perform arithmetic operations, including adding, subtracting, and multiplying with complex numbers

1. Perform the indicated operations $(5 + 3i) + (-7 + 6i) - (15 - 10i)$.

$$\begin{array}{r} \underline{5+3i} \quad \underline{-7+6i} \quad \underline{-15+10i} \\ -17+19i \end{array}$$

2. Simplify the expression $(3 - 4i)^2$.

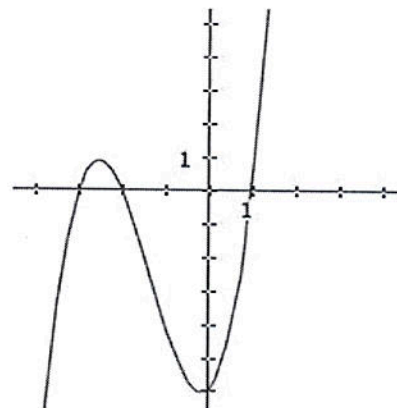
$$\begin{array}{l} (3-4i)(3-4i) \\ 9-12i-12i+16i^2 \\ 9-24i-16 \\ -7-24i \end{array}$$

$16i^2 = 16(-1) = -16$

Target 2.B: Graph, transform and identify the key features of a polynomial function and make connections between algebraic and graphical forms.

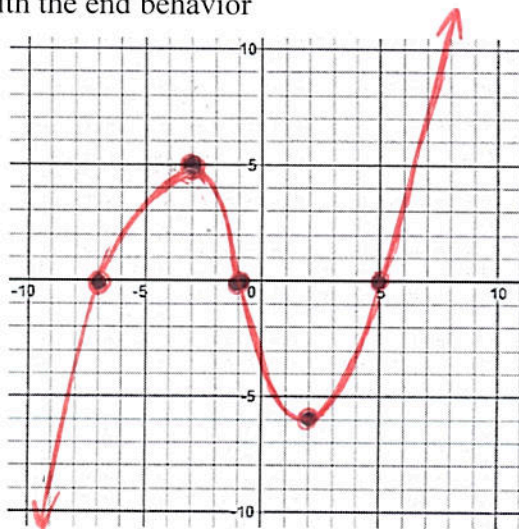
3. Identify the key features that describe the graphed polynomial.

- A. The polynomial has a(n) odd degree. (even/odd)
 B. The polynomial has 3 zeros. (number of zeros)
 C. The polynomial has 1 maximums and 1 minimums (number of each).
 D. The polynomial has zeros at $x = \underline{-3}$, $x = \underline{-2}$, $x = \underline{1}$
 E. The polynomial has a factors of $(\underline{x+3})(\underline{x+2})(\underline{x-1})$



4. Graph a polynomial function with real zeros at $x = -7, -1, 5$, a local minima at approximately $(2, -6)$, a local maxima at approximately $(-3, 5)$, and with the end behavior

$$\lim_{x \rightarrow -\infty} f(x) = -\infty \text{ and } \lim_{x \rightarrow +\infty} f(x) = +\infty$$



Target 2.F: Solve polynomials algebraically and graphically by using technology

11. Graph the polynomial $x^3 - 2x^2 - 5x + 6 = 0$ in your calculator and determine its solutions.

$\{-2, 1, 3\}$

12. Using algebra, find the solutions of the polynomial equation $3x^3 + 6x^2 = 24x$

$$3x^3 + 6x^2 - 24x = 0$$

$$3x(x^2 + 2x - 8) = 0$$

$$3x(x+4)(x-2) = 0$$

$$\frac{3x}{3} = 0 \quad x = 0$$

$$\frac{x+4}{-4 \quad -4} = 0 \quad x = -4$$

$$\frac{x-2}{+2 \quad +2} = 0 \quad x = 2$$

$\{-4, 0, 2\}$

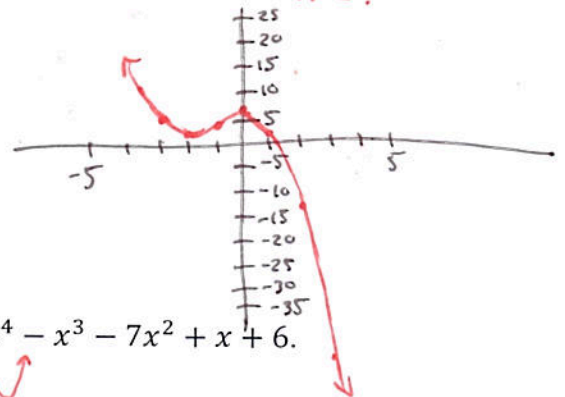
Target 2.G: Analyze a polynomial function in multiple representations (equation, table, or graph) within a context and make conclusions on the features

13. The following table of values represents a cubic polynomial function. Within which interval does a relative minima occur?

- A. $[-3, -1]$
- B. $[-2, 0]$
- C. $[-1, 1]$
- D. $[0, 2]$
- E. $[1, 3]$

x	f(x)
-3	5
-2	2
-1	4
0	6
1	2
2	-14
3	-48

Think about it...
What would the graph look like?



14. Answer the following questions regarding the function $f(x) = x^4 - x^3 - 7x^2 + x + 6$.

a. Describe the end behavior using limit notation.

$\lim_{x \rightarrow -\infty} f(x) = +\infty$ $\lim_{x \rightarrow +\infty} f(x) = -\infty$

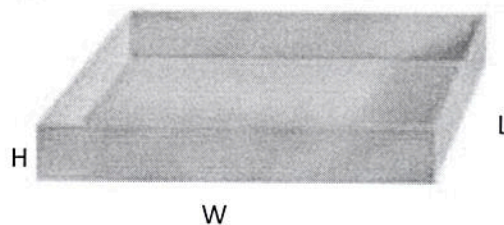
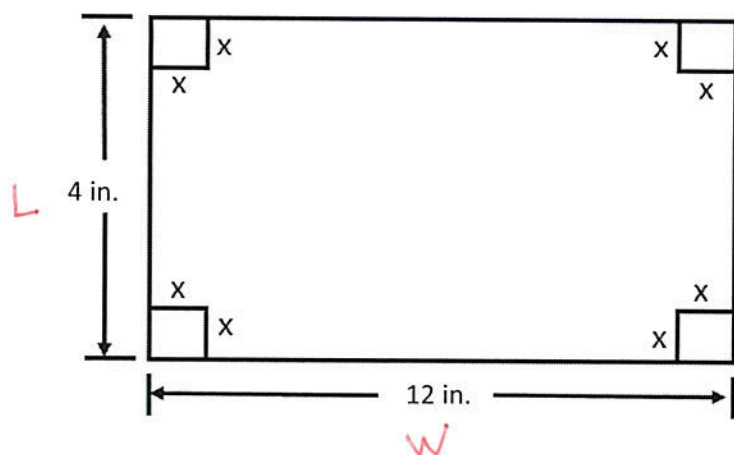
b. State the range in interval notation. ← use calculator to graph
Lowest min is -12.9 at 2.25

Range: $[-12.9, +\infty)$

c. Is the function increasing or decreasing in the interval of the domain of $(-1.5, 0)$.

Increasing

15. A metalworker wants to make an open box from a sheet of metal, by cutting equal squares from each corner as shown.



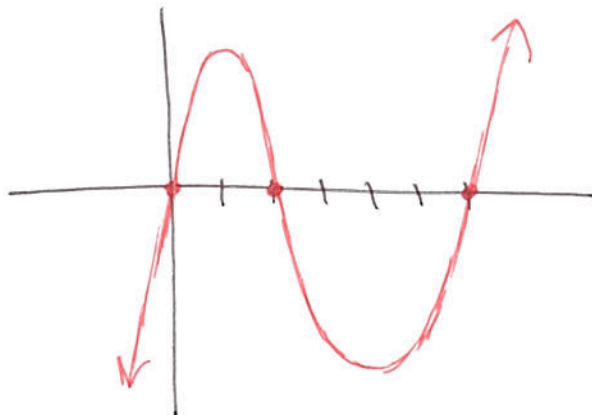
- a. Write expressions that will represent the length, width, and height of the open box.

$$L = \underline{4 - 2x} \quad W = \underline{12 - 2x} \quad H = \underline{x}$$

- b. Use your expressions from part (a) to write a function in factored form for the volume of the box.

$$f(x) = \underline{(4 - 2x)(12 - 2x)(x)}$$

- c. Draw a sketch of the graph of the function. (Use calculator)



- d. Find the maximum volume of the box and the side length of the cut out squares that generate this volume. Round answers to the nearest hundredth.

* Find the relative max because $f(x)$ represents the volume. $(0.903, 20.2)$

Rel. max is 20.2 at 0.903.

Max. volume is 20.2 in³ when $x = 0.903$ (height)