

Assignment : Complex Number

(Please show steps)

Goal:

Apply polynomial functions to the real world; interpret the polynomial functions by graphing them in the complex number plane with given information

Objectives:

- Express square root of negative number as an imaginary number
- Plot a complex number on the complex plane
- Recognize quadratic functions' characteristics
- Understand the relationship of graph and quadratic function
- Calculate quadratic local values and extreme values
- Solve a quadratic function problem in the real world and represents it with graph
- Identify power functions' end behavior
- Identify polynomial's end behavior
- Identify polynomial's intercepts, turning points and local maximum and minimum
- Graphing polynomial in complex number system by using given information

Problem1:

For the given quadratic function $f(x) = 2x^2 - 4x + 2$, please complete the following questions:

- 1) Determine the domain and range of the quadratic function
- 2) Find the solutions when $f(x) = 0$
- 3) Use the vertex (h, k) formula to find the vertex of $f(x)$ after converting $f(x)$ to a standard form
- 4) Find the x intercepts and y intercepts of $f(x)$
- 5) Determining the opening of $f(x)$
- 6) Using information 1) - 5) above, sketch the graph of the quadratic function $f(x)$

Solution:

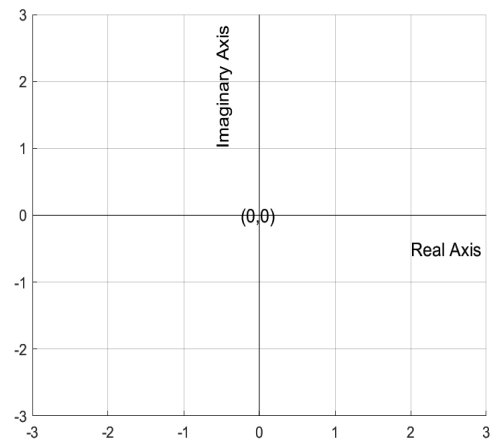


Figure 1:

Problem2:

For the following given function, $g(x) = x^8 - x^6 - 12x^4$, please draw conclusions about the function graph

- 1) Determine the domain and range of the polynomial function $g(x)$
- 2) Find the solutions when $g(x) = 0$
- 3) Find the x intercepts and y intercepts of $g(x)$
- 4) Find the degree of the polynomial, using the information to determining the end behaviors of $g(x)$
- 5) What are turning points of the $g(x)$. Make a table to determine the end behaviors at the turning points of $g(x)$
- 6) How to find local maximum and minimum of $g(x)$?
- 7) Draw a conclusion using graphing calculator to graph the polynomial function $g(x)$ on the given plane below

Solution:

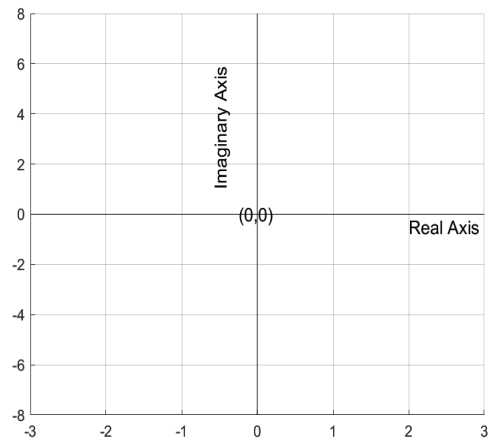


Figure 2:

Problem3:

A rectangle has a length of 12 units and width of 10 units. Squares x by x units are cut out of each corner of the rectangle, and then the sides are folded up to create an open box.

- 1) Express the volume of the box, called $V(x)$, as a polynomial function in terms of x .
- 2) Using technology and graphing calculator to sketch the graph of the polynomial function $V(x)$
- 3) Using the graph to estimate the maximum and minimum value for $V(x)$

Solution:

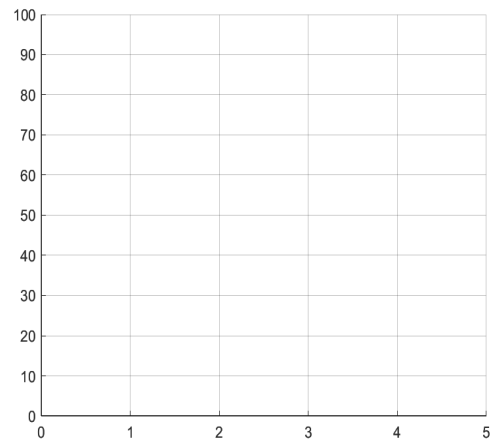


Figure 3:

Objectives	Problem1	Problem2	Problem3
Express square root of negative number as an imaginary number		1pt	
Plot a complex number on the complex plane		1pt	
Recognize quadratic functions' characteristics	3pt		
Understand the relationship of graph and quadratic function	1pt		
Calculate quadratic local values and extreme values	3pt		
Solve a quadratic function problem in the real world and represents it with graph	3pt		
Identify power functions' end behavior		1pt	
Identify polynomial's end behavior		3pt	
Identify turning points		1pt	
Graphing polynomial in complex number system by using given information		3pt	
Solve a practical problem through a polynomial function model			5pt

Figure 4: