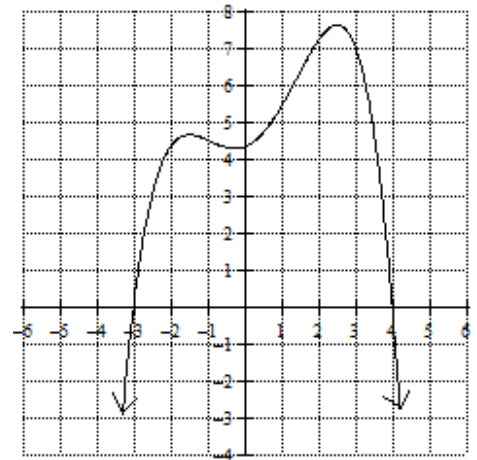


Homework 4.1

Given the graph of the function $h(x)$, a polynomial function of least degree, pictured to the right, answer questions 1 – 2.

1. What type of function is $h(x)$? Give a reason for your answer.

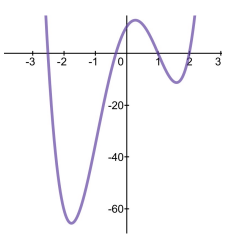
If the graph of $h(x)$ were shifted down, the maximum number of zeros is 4. By FTA, $h(x)$ is likely quartic.



2. What is the combination of positive, negative, imaginary and zero roots of $h(x)$? Give a reason for your answer.

1 negative root $\rightarrow x = -3$
 1 positive root $\rightarrow x = 4$
 The two remaining roots are imaginary.

Answer questions 3 – 9 about the function $f(x) = 6x^4 - x^3 - 34x^2 + 19x + 10$.

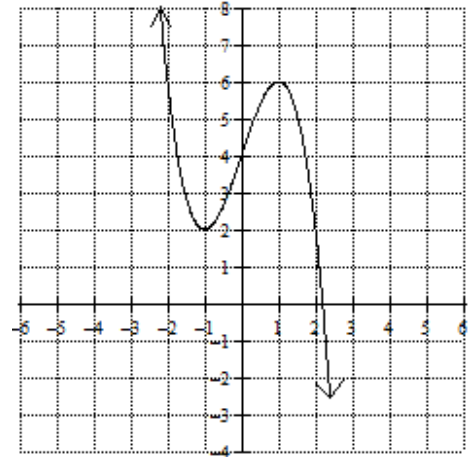
<p>3. How many sign changes are in the equation of $f(x)$?</p> <p>$f(x) = 6x^4 - x^3 - 34x^2 + 19x + 10$</p> <p>2 SIGN CHANGES</p>	<p>4. How many positive roots is/are possible for $f(x)$?</p> <p>$f(x)$ has 2 or 0 positive roots</p>																				
<p>5. Find an equation for $f(-x)$. How many sign changes are in the equation of $f(-x)$?</p> <p>$f(-x) = 6x^4 + x^3 - 34x^2 - 19x + 10$</p> <p>2 SIGN CHANGES</p>	<p>6. How many negative roots is/are possible for $f(x)$?</p> <p>$f(x)$ has 2 or 0 NEGATIVE roots</p>																				
<p>7. Is zero a possible root of $f(x)$? If so, how many times is zero a root? Give a reason why or why not.</p> <p>Since $f(x)$ has a constant term, x^n is not a factor.</p> <p>$\therefore x=0$ is not a possible root.</p>	<p>8. Create a table displaying the all of the possible combinations of positive, negative, imaginary and zero roots of $f(x)$.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>P</th> <th>N</th> <th>Zero</th> <th>i</th> </tr> </thead> <tbody> <tr> <td>2</td> <td>2</td> <td>0</td> <td>0</td> </tr> <tr> <td>2</td> <td>0</td> <td>0</td> <td>2</td> </tr> <tr> <td>0</td> <td>2</td> <td>0</td> <td>2</td> </tr> <tr> <td>0</td> <td>0</td> <td>0</td> <td>4</td> </tr> </tbody> </table>	P	N	Zero	i	2	2	0	0	2	0	0	2	0	2	0	2	0	0	0	4
P	N	Zero	i																		
2	2	0	0																		
2	0	0	2																		
0	2	0	2																		
0	0	0	4																		
<p>9. Using a graphing calculator, sketch a graph of $f(x)$. Then, based on the graph, which combination from your table in exercise 8 is the correct combination. Give a reason for your answer.</p> <div style="display: flex; align-items: center;">  <div style="margin-left: 20px;"> <table border="1" style="margin-bottom: 10px;"> <thead> <tr> <th>P</th> <th>N</th> <th>Zero</th> <th>i</th> </tr> </thead> <tbody> <tr> <td>2</td> <td>2</td> <td>0</td> <td>0</td> </tr> </tbody> </table> <p>is the correct combo because $f(x)$ crosses the negative x-axis twice and crosses the positive x-axis twice.</p> </div> </div>		P	N	Zero	i	2	2	0	0												
P	N	Zero	i																		
2	2	0	0																		

Given the graph of the function $g(x)$, a polynomial function of least degree, pictured to the right, answer questions 10 – 11.

10. What type of function is $g(x)$? Give a reason for your answer.

If $g(x)$ were shifted down, it could cross the x -axis 3 times.

By the FTA, $g(x)$ is likely cubic.



11. What is the combination of positive, negative, imaginary and zero roots of $g(x)$? Give a reason for your answer.

By FTA, since $g(x)$ is likely cubic, it has 3 roots.

The graph of $g(x)$ shows 1 positive, 0 negative, 0 zero roots.

The two remaining roots must be imaginary.

12. Given the function below, create a chart of all of the possible numbers of positive, negative, imaginary and zero roots of the function. Show your analysis.

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

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

P	N	Zero	i
1	2	0	0
1	0	0	2

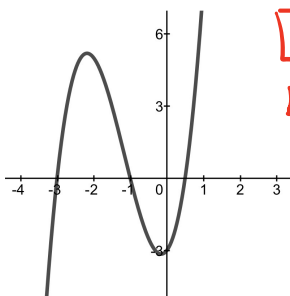
14. Given the function below, create a chart of all of the possible numbers of positive, negative, imaginary and zero roots of the function. Show your analysis.

$$g(x) = x^4 + 2x^3 - 3x^2$$

$$g(-x) = x^4 - 2x^3 - 3x^2$$

P	N	Z	i
1	1	2	0

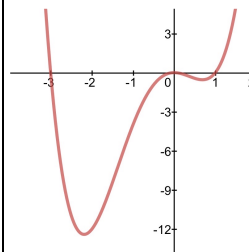
13. Using a graphing calculator, sketch a graph of $p(x)$. Then, based on the graph, which combination from your table in exercise 12 is the correct combination. Give a reason for your answer.



P	N	Zero	i
1	2	0	0

b/c $p(x)$ crosses the negative x -axis twice and the positive x -axis once.

15. Using a graphing calculator, sketch a graph of $g(x)$. Then, based on the graph, which combination from your table in exercise 14 is the correct combination. Give a reason for your answer.



P	N	Zero	i
1	1	2	0

b/c the graph of $g(x)$ crosses the negative and positive x -axis once and is tangent to the x -axis at $x=0$.