

This Worksheet May be done with technology:

Free Graphing technology If you do not currently have graphing software installed on your computer, please take the time to install some:


GeoGebra: <http://www.geogebra.org/cms/en/download>

GraphCalc: <http://www.graphcalc.com/download.shtml>

MHF4U: Functions Unit 1 Activity 1 Characteristics of functions Homework

Instructions: Complete this homework based on the topics that were covered in this activity. Then correct your own work using the solutions at the end of this file.

1. For each of the following functions complete the chart and sketch the function using GraphCalc.

Function	degree	Sign of leading coefficient ^{+/−}	End behaviour $x \rightarrow \infty$	End behaviour $x \rightarrow -\infty$	Sketch (on separate paper)
$y = 3x^2 - 4x - 1$	2	+	$y \rightarrow \infty$	$y \rightarrow \infty$	
$y = -x^4 - x^3 + x^2 + 3$					
$y = 2x^6 - 9x^4 + 11x^2 + x - 13$					
$y = -2x^4 - 4x^3 + x^2 + 6x + 5$					
$y = -x^3 + 8x^2 - 4x + 1$					

2. Based on the above chart, find the relationship between the end behaviour of a function and the degree.

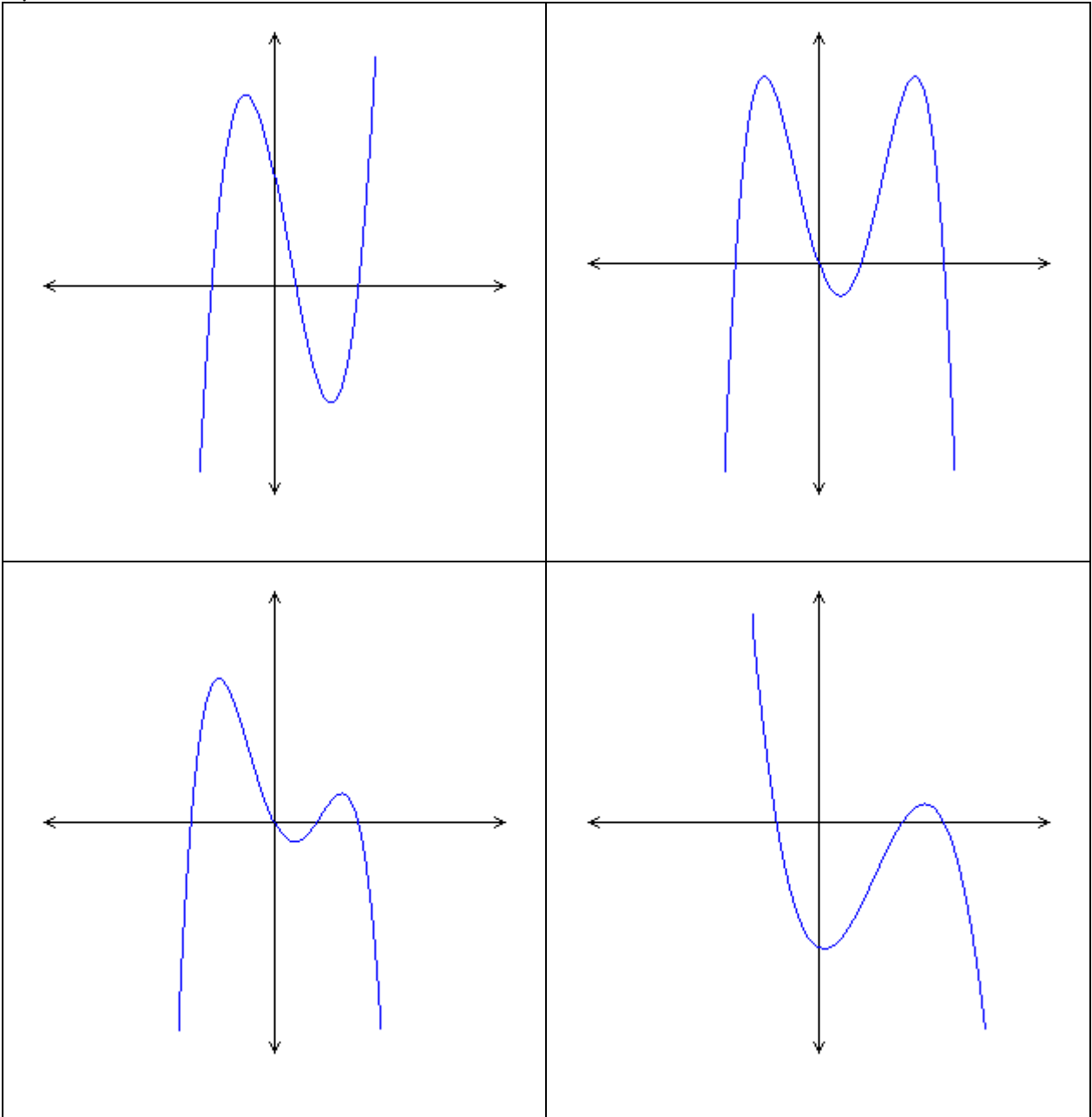
3. Using GraphCalc, fill-in the following chart:

Function	degree	Number of zeroes
$y = 3x^2 - 4x - 1$		
$y = -x^4 - x^3 + x^2 + 3$		
$y = 2x^6 - 9x^4 + 11x^2 + x - 13$		
$y = -2x^4 - 4x^3 + x^2 + 6x + 5$		
$y = -x^3 + 8x^2 - 4x + 1$		

4. Using Graphcalc and your results from question #3, what is the minimum and maximum number of zeros possible for each of the following polynomial functions with the following degrees:

- a) 2 (b) 3 (c) 5 (d) 6 (e) 7 (f) n

5. Identify the sign of the leading coefficient and describe the end behaviour. Using this information, decide if each function is cubic or quartic.



6. Without using any graphing technology, graph the following polynomial functions:

Function: $y = -x(x-2)^4(x+3)$

Degree:

Sign:

Quadrants:

end behaviours: as $x \rightarrow -\infty$, $y \rightarrow$ _____

as $x \rightarrow \infty$, $y \rightarrow$ _____

Roots/Zeros:

Bounce at?

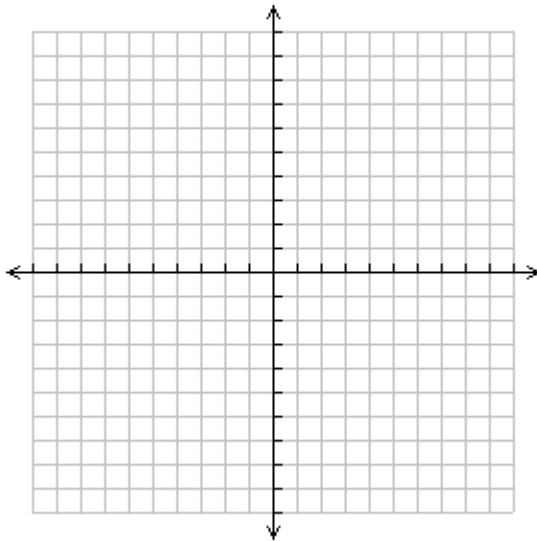
Bend at?

Straight through at?

y-intercept: (sub $x=0$)

domain:

Sketch using the above information:



Use GraphCalc or GeoGebra to check

For the following you must use graphing software. (In Calculus you'll be able to determine the turning points too.)

range:

intervals of increase:

intervals of decrease:

Function: $y = x^3(x-4)(x+5)^2$

Degree:

Sign:

Quadrants:

end behaviours: as $x \rightarrow -\infty$, $y \rightarrow$ _____

as $x \rightarrow \infty$, $y \rightarrow$ _____

Roots/Zeros:

Bounce at?

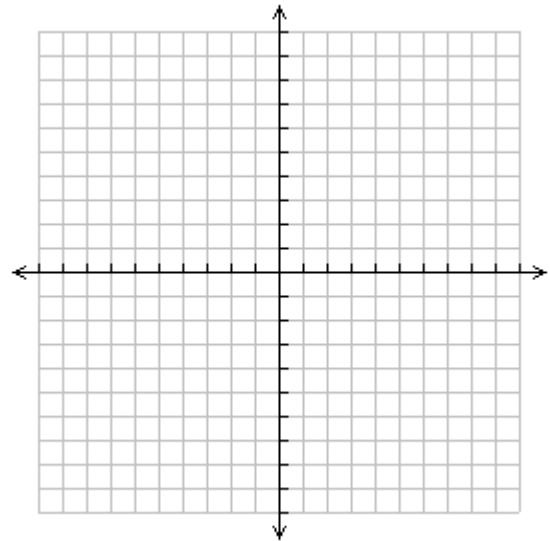
Bend at?

Straight through at?

y-intercept: (sub $x=0$)

domain:

Sketch using the above information:



Use GraphCalc or GeoGebra to check

For the following you must use graphing software. (In Calculus you'll be able to determine the turning points too.)

range:

intervals of increase:

intervals of decrease:

Function: $y = -(x+1)^5(x-3)^4$

Degree:

Sign:

Quadrants:

end behaviours: as $x \rightarrow -\infty$, $y \rightarrow$ _____

as $x \rightarrow \infty$, $y \rightarrow$ _____

Roots/Zeros:

Bounce at?

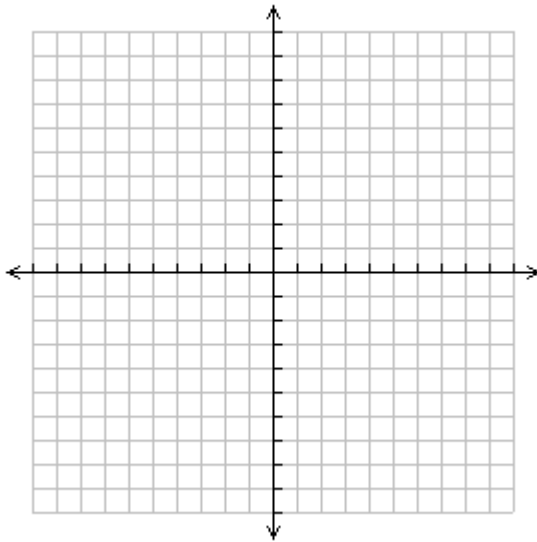
Bend at?

Straight through at?

y-intercept: (sub $x=0$)

domain:

Sketch using the above information:



Use GraphCalc or GeoGebra to check

For the following you must use graphing software. (In Calculus you'll be able to determine the turning points too.)

range:

intervals of increase:

intervals of decrease:

Function: $y = (x+3)^2(x-1)^3$

Degree:

Sign:

Quadrants:

end behaviours: as $x \rightarrow -\infty$, $y \rightarrow$ _____

as $x \rightarrow \infty$, $y \rightarrow$ _____

Roots/Zeros:

Bounce at?

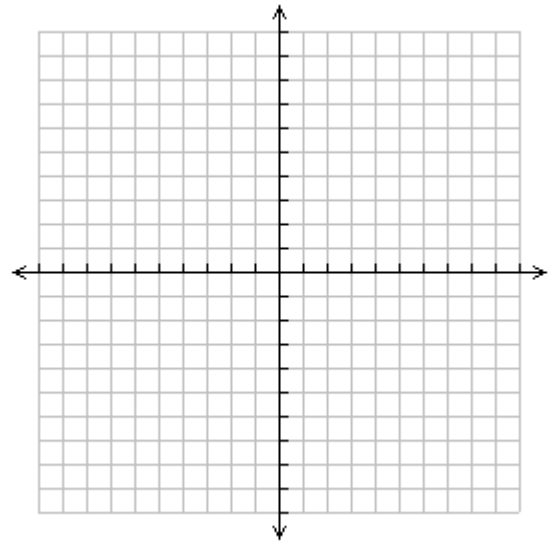
Bend at?

Straight through at?

y-intercept: (sub $x=0$)

domain:

Sketch using the above information:



Use GraphCalc or GeoGebra to check

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range:

intervals of increase:

intervals of decrease:

Function: $y = -x^4(x+3)(x-4)^3$

Degree:

Sign:

Quadrants:

end behaviours: as $x \rightarrow -\infty$, $y \rightarrow$ _____

as $x \rightarrow \infty$, $y \rightarrow$ _____

Roots/Zeros:

Bounce at?

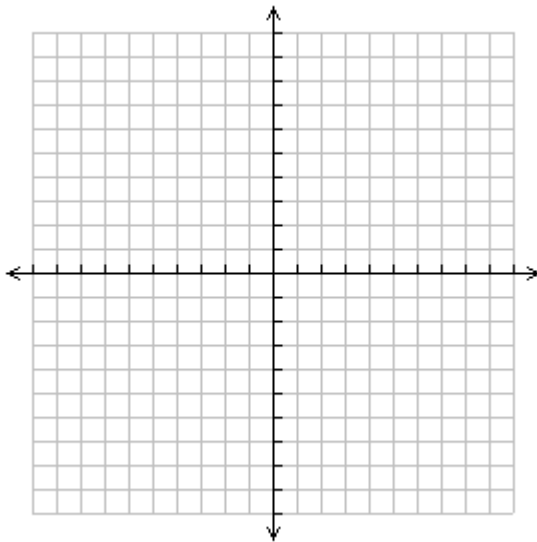
Bend at?

Straight through at?

y-intercept: (sub $x=0$)

domain:

Sketch using the above information:



Use GraphCalc or GeoGebra to check

For the following you must use graphing software. (In Calculus you'll be able to determine the turning points too.)

range:

intervals of increase:

intervals of decrease:

Function: $y = (x-3)(x+5)(x-2)^2$

Degree:

Sign:

Quadrants:

end behaviours: as $x \rightarrow -\infty$, $y \rightarrow$ _____

as $x \rightarrow \infty$, $y \rightarrow$ _____

Roots/Zeros:

Bounce at?

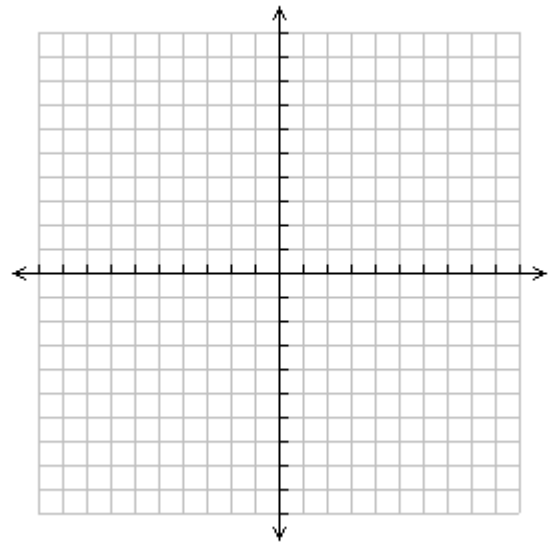
Bend at?

Straight through at?

y-intercept: (sub $x=0$)

domain:

Sketch using the above information:



Use GraphCalc or GeoGebra to check

For the following you must use graphing software. (In Calculus you'll be able to determine the turning points too.)

range:

intervals of increase:

intervals of decrease: