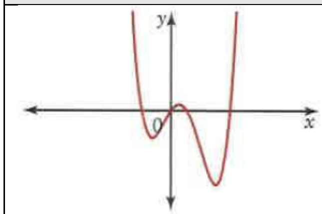
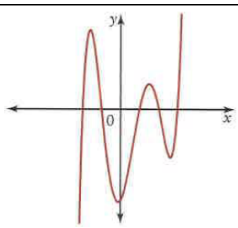
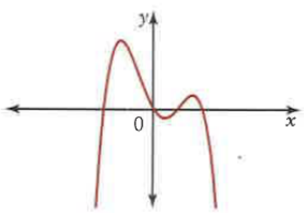
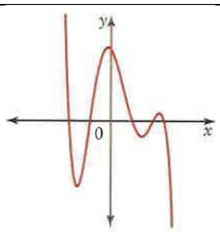
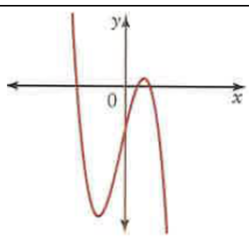
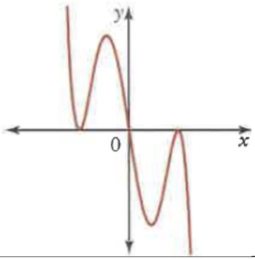
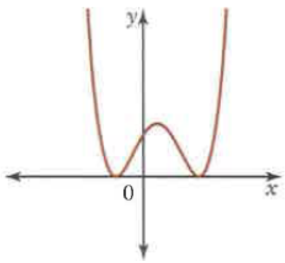
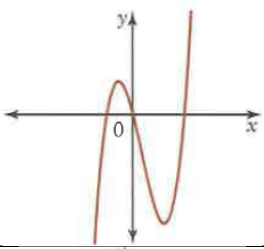
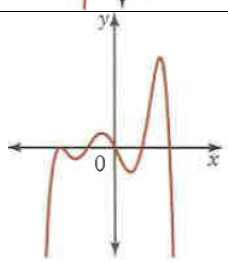
W2 – 1.2 – Characteristics of Polynomial Functions
MHF4U
Jensen

1) Complete the following table

Graph	Sign of Leading Coefficient	Even or Odd Degree?	End Behaviour	Symmetry	Number of turning points	Number of x-intercepts	Least Possible Degree
							
							
							
							
							

2) Complete the following table

Graph	Sign of Leading Coefficient	Even or Odd Degree?	End Behaviour	Symmetry	Number of turning points	Number of x-intercepts	Least Possible Degree
							
							
							
							

3) Complete the following table

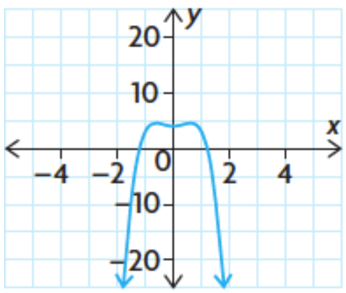
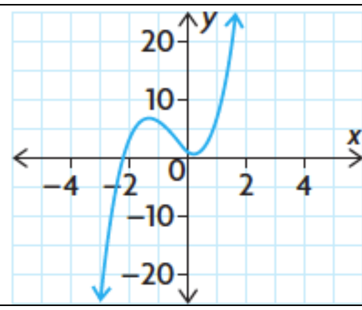
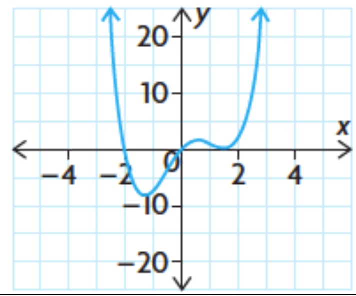
Equation	Degree	Sign of Leading Coefficient	Even or Odd Degree?	End Behaviour	Possible number of turning points	Possible number of x-intercepts
$f(x) = -4x^4 + 3x^2 - 15x + 5$						
$g(x) = 2x^5 - 4x^3 + 10x^2 - 13x + 8$						
$p(x) = 4 - 5x + 4x^2 - 3x^3$						
$h(x) = 2x(x-5)(3x+2)(4x-3)$						

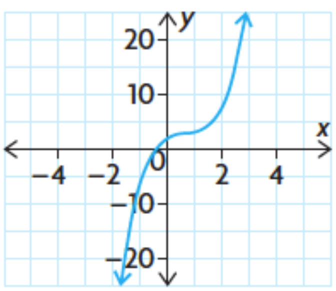
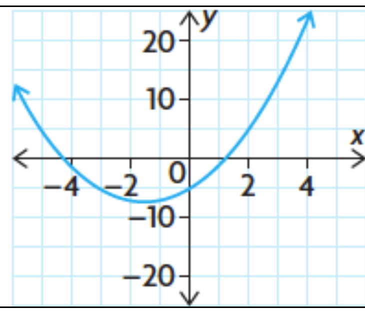
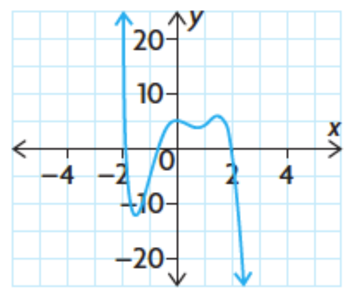
4) Use end behaviours, turning points, and zeros to match each equation with the most likely graph. Write the letter of the equation beneath the graph.

A) $y = 2x^3 - 4x^2 + 3x + 2$ **B)** $y = -4x^4 + 3x^2 + 4$ **C)** $y = x^2 + 3x - 5$

D) $y = x^4 - x^3 - 4x^2 + 5x$ **E)** $y = -2x^5 + 3x^4 + 6x^3 - 10x^2 + 2x + 5$

F) $y = 3x^3 + 5x^2 - 3x + 1$

5) State the degree of the polynomial function that corresponds to each constant finite difference. Then determine the value of the leading coefficient for each polynomial function.

a) second differences = -8

b) fourth differences = 24

6) Use finite differences to determine the degree and value of the leading coefficient for each polynomial function.

a)

x	y
−3	−45
−2	−16
−1	−3
0	0
1	−1
2	0
3	9
4	32

b)

x	y
−2	−40
−1	12
0	20
1	26
2	48
3	80
4	92
5	30

7) By analyzing the impact of growing economic conditions, a demographer establishes that the predicted population, P, of a town t years from now can be modelled by the function

$P(t) = 6t^4 - 5t^3 + 200t + 12000$

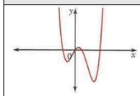
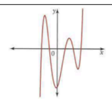
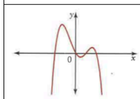
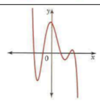
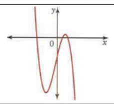
a) What is the value of the constant finite differences

b) What is the current population of the town

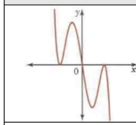
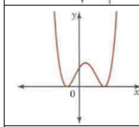
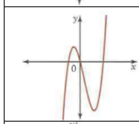
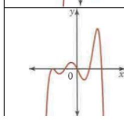
c) What will the population of the town be 10 years from now

ANSWER KEY

1)

Graph	Sign of Leading Coefficient	Even or Odd Degree?	End Behaviour	Symmetry	Number of turning points	Number of x-intercepts	Least Possible Degree
	POS	EVEN	Q2 to Q1	NONE	3	4	4
	POS	ODD	Q3 to Q1	NONE	4	5	5
	NEG	EVEN	Q3 to Q4	NONE	3	4	4
	NEG	ODD	Q2 to Q4	NONE	4	5	5
	NEG	ODD	Q2 to Q4	POINT	2	3	3

2)

Graph	Sign of Leading Coefficient	Even or Odd Degree?	End Behaviour	Symmetry	Number of turning points	Number of x-intercepts	Least Possible Degree
	NEG	ODD	Q2 to Q4	Point	4	3	5
	POS	EVEN	Q2 to Q1	Line	3	2	4
	POS	ODD	Q3 to Q1	Point	2	3	3
	NEG	EVEN	Q3 to Q4	None	5	5	6

3)

Equation	Degree	Sign of Leading Coefficient	Even or Odd Degree?	End Behaviour	Possible number of turning points	Possible number of x-intercepts
$f(x) = -4x^4 + 3x^2 - 15x + 5$	4	NEG	EVEN	Q3 → Q4	3, 1	4, 3, 2, 1, 0
$g(x) = 2x^5 - 4x^3 + 10x^2 - 13x + 8$	5	POS	ODD	Q3 → Q1	4, 2, 0	5, 4, 3, 2, 1
$p(x) = 4 - 5x + 4x^2 - 3x^3$	3	NEG	ODD	Q2 → Q4	2, 0	3, 2, 1
$h(x) = 2x(x-5)(3x+2)(4x-3)$	4	POS	EVEN	Q2 → Q1	3, 1	4, 3, 2, 1, 0

4) B F D
A C E

5) a) degree 2, $a = -4$ **b)** degree 4, $a = 1$

6) a) degree 3, $a = 1$ **b)** degree 4, $a = -1$

7) a) 144 **b)** 12 000 **c)** 69 000