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Chapter 1 Review

BLM 1–18

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1.1 Power Functions

1. State the degree and the leading coefficient of each polynomial function.

a) $f(x) = 2x^3 + 3x - 1$

b) $g(x) = 5x - 6$

c) $h(x) = x^3 - 2x^2 - 5x^4 + 3$

d) $p(x) = -3x^5 + 2x^3 - x - 1$

e) $r(x) = 21 - 2x + 4x^2 - 6x^3$

2. For each graph

i) state whether the corresponding function has even degree or odd degree

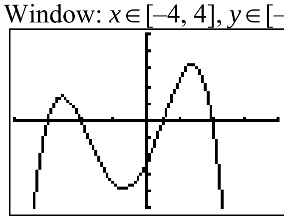
ii) state whether the leading coefficient is positive or negative

iii) state the domain and range

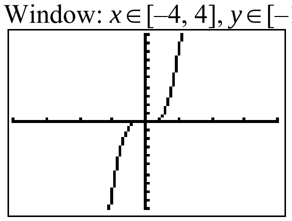
iv) identify any symmetry

v) describe the end behaviour

a) Window: $x \in [-4, 4]$, $y \in [-25, 25]$, Yscl = 5



b) Window: $x \in [-4, 4]$, $y \in [-10, 10]$,



3. Complete the table. Write each function in the appropriate row of column 2. Give reasons for your choices.

$y = 3x^7$, $y = -\frac{1}{2}x^3$, $y = -0.25x^6$, $y = 2x^4$

End Behaviour	Function	Reasons
Extends from quadrant 3 to quadrant 1		
Extends from quadrant 2 to quadrant 4		
Extends from quadrant 2 to quadrant 1		
Extends from quadrant 3 to quadrant 4		

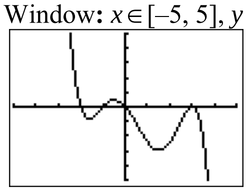
1.2 Characteristics of Polynomial Function

4. Match each graph of a polynomial function with the corresponding equation. Justify your choice.

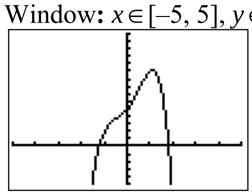
i) $y = 3x^2 + 4x - 2x^4 + 5$

ii) $y = -x^5 + 3x^4 + 7x^3 - 15x^2 - 18x$

a) Window: $x \in [-5, 5]$, $y \in [-50, 50]$, Yscl = 5



b) Window: $x \in [-5, 5]$, $y \in [-5, 15]$



5. For each polynomial function in question 4

a) determine which finite differences are constant

b) find the value of the constant finite differences

6. State the degree of the polynomial function that corresponds to each constant finite difference and determine the value of the leading coefficient of each.

a) third differences = – 4

b) first differences = 6

c) sixth differences = –720

d) fourth differences = 96

e) second differences = –12

7. The table represents a polynomial function.

x	y
−3	168
−2	0
−1	−40
0	−24
1	0
2	8
3	0
4	0

Use finite differences to determine

a) the degree

b) the sign of the leading coefficient

c) the value of the leading coefficient

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1.3 Equations and Graphs of Polynomial Functions

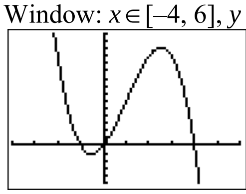
8. Use each graph of a polynomial function to determine

i) the x-intercept(s) and the factors of the function

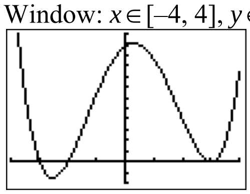
ii) the least possible degree and sign of the leading coefficient

iii) the interval(s) where the function is positive and the interval(s) where the function is negative

a) Window: $x \in [-4, 6]$, $y \in [-5, 15]$



b) Window: $x \in [-4, 4]$, $y \in [-10, 60]$, Yscl = 5



9. Sketch a graph of each polynomial function.

a) $y = 2x(x + 3)(x - 4)$

b) $y = -3(x - 2)(x + 4)(x^2 - 1)$

10. The zeros of a function are -4, $-\frac{2}{5}$, and 3. Determine an equation for the function if it has y-intercept 8.

11. Determine algebraically, if each polynomial function has line symmetry about the y-axis, point symmetry about the origin, or neither. Graph the functions to verify your answer.

a) $f(x) = 3x^5 - 2x^3 + x$

b) $g(x) = 2x^4 + 3x^3 - 2x - 6$

c) $h(x) = 2x^6 - 5x^4 + x^2 + 4$

1.4 Transformations

12. i) Describe the transformations that must be applied to the graph of each power function, $f(x)$, to obtain the transformed function. Then, write the corresponding equation.

ii) State the domain and range of each transformed function.

a) $f(x) = x^4$, $y = -2f(x - 1) + 4$

b) $f(x) = x^3$, $y = \frac{1}{3}f(2x + 6) - 5$

13. Write an equation for the function that is the result of each set of transformations.

a) $f(x) = x^5$ is stretched vertically by a factor of 5, compressed horizontally by a factor of $\frac{1}{4}$ and translated 2 units to the left and 1 unit down.

b) $f(x) = x^6$ is compressed vertically by a factor of $\frac{1}{2}$, reflected in the y-axis and translated 4 units to the right and 3 units up.

1.5 Slopes of Secants and Average Rate of Change

14. The population of a small town, p, is modelled by the function $p(t) = 10\,050 + 225t - 20t^2$, where t is the time in years from now.

a) Determine the average rate of change of the population from

i) year 0 to year 5

ii) year 5 to year 8

iii) year 8 to year 10

b) Interpret your answers in part a).

c) Graph the function to verify your interpretation in part b).

1.6 Slopes of Tangents and Instantaneous Rate of Change

15. After being built, a car must be painted. The revenue, R, in dollars, when x cars are painted can be modelled by the function $R(x) = 1000x - 0.01x^2$.

a) Determine the average rate of change of revenue when painting 20 to 50 cars.

b) Estimate the instantaneous rate of change of revenue after painting 50 cars.

c) Interpret the results found in parts a) and b).