Name: _____ Date: _____

Chapter 1 Test

BLM 1–20

For questions 1 and 2, select the best answer.

1. Which statement is true for a polynomial function? For those that are not true, provide a counterexample.

A with degree 2 and a positive leading coefficient, the graph extends from quadrant 3 to quadrant 4

B with degree 5 and a negative leading coefficient, the graph extends from quadrant 2 to quadrant 4

C with degree 4 and a negative leading coefficient, the graph extends from quadrant 2 to quadrant 1

D with degree 3 and a positive leading coefficient, the graph extends from quadrant 2 to quadrant 1

2. Which statement is true? For those that are not true, provide a counterexample. For the function $y = -2(4x - 8)^3$, compared to the base function $y = x^3$, there is

A a reflection in the y-axis

B a horizontal stretch by a factor of 4

C a horizontal translation 8 units to the right

D a vertical stretch by a factor of 2

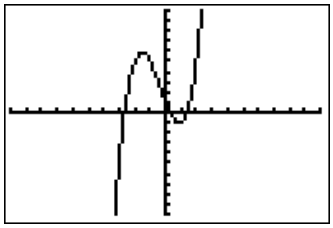
3. Match each graph of a polynomial function with the corresponding equation. Justify your choice.

i) $y = -x^5 - 3x^2 + 7$

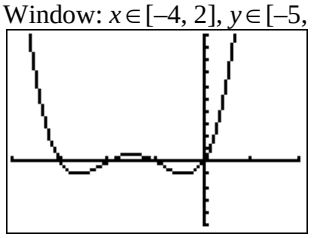
ii) $y = x^4 + 6x^3 + 11x^2 + 6x$

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

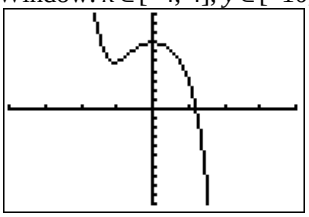
a)



b) Window: $x \in [-4, 2]$, $y \in [-5, 10]$



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



4. For each polynomial function in question 3 determine which finite differences are constant and find the values of the constant differences.

5. A quartic function has zeros – 4, –2, and 1(order 2).

a) Write a general equation for a polynomial function that satisfies this description.

b) Determine an equation for a function with the zeros given above that passes through the point (–3, 12).

c) Sketch the function found in part b). Then, determine the interval(s) where the function is positive and the interval(s) where the function is negative.

6. a) Identify the parameters a, k, d, and c in the polynomial function $y = 4(3x - 12)^2 - 2$.

b) Describe how each parameter transforms the base function $y = x^2$.

c) State the domain, range, vertex and the equation of the axis of symmetry of the transformed function.

c) Sketch graphs of the base function and the transformed function on the same set of axes.

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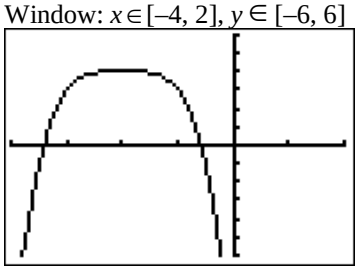
7. Transformations are applied to $y = x^4$ to obtain the graph shown. Determine its equation.

Window: $x \in [-4, 2]$, $y \in [-6, 6]$



8. **a)** The population, P, of a town t years from now can be modelled by the function $P(t) = 6t^3 - 100t + 25\,000$. Describe the key features of the graph representing the function, if no restrictions are considered.

b) What is the current population of the town?

c) What is the value of the constant finite differences for the population function?

d) What are the restrictions that should be considered?

e) Use Technology When will the town have a population of approximately 120 000 people? Round your answer to one decimal place.

9. A stone is thrown from the top of a bridge into a lake below such that its height, h, in metres, can be modelled by the function $h(t) = 60 - 8t - 4.9t^2$, where t is measured in seconds.

a) Determine the average rate of change of the height of the stone in the first 2.5 s after it was dropped. Round your answer to one decimal place.

b) Estimate the instantaneous rate of change of the height of the stone after 2.5 s.

c) Interpret your answers from parts a) and b).