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2.4 Families of Polynomial Functions

BLM 2–6
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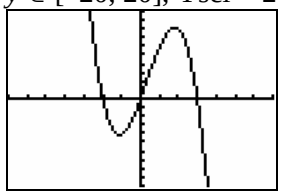
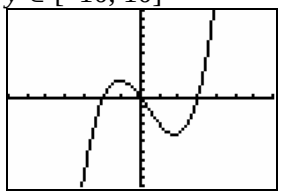
1. The zeros of a quadratic function are –3 and 5.
a) Determine an equation for the family of functions with these zeros.
b) Write equations for two functions with these zeros.
c) Determine an equation for the member of the family that passes through the point (–1, 6).

2. Examine the following functions. Which function does not belong to the same family? Explain.
A $y = 4(2x + 1)(x – 5)(x + 7)$
B $y = 4(x – 5)(2x + 1)(x + 7)$
C $y = –4(x – 5)(x + 7)(2x + 1)$
D $y = 4(x + 7)(2x – 1)(x – 5)$

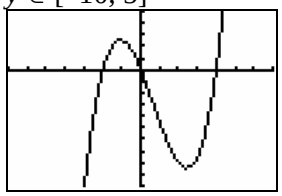
3. The graphs of three polynomial functions are given. Which graph represents a function that does not belong to the same family as the other two? Explain.
A Window variables: $x \in [–7, 7]$, $y \in [–20, 20]$, Yscl = 2



B Window variables: $x \in [–7, 7]$, $y \in [–10, 10]$



C Window variables: $x \in [–7, 7]$, $y \in [–10, 5]$



4. Determine an equation for the function that corresponds to each graph in question 3.

5. Which of the following polynomial functions belong to the same families? Explain.
A $y = –0.8(x – 4)(x + 1)(x + 3)$
B $y = -\frac{2}{3}(x – 1)(x + 3)(x + 4)$
C $y = 0.8(x – 4)(x + 3)(x + 1)$
D $y = 0.5(x + 1)(x – 4)(x + 3)$
E $y = –2(x – 1)(x + 4)(x + 3)$
F $y = 3(x + 3)(x – 1)(x + 4)$

6. **a)** Write an equation for a family of functions with each set of zeros.
i) –5, 2, 7
ii) –6, –2, 3
iii) –4, –1, 2, 5
b) Determine an equation for the member of the family that passes through the point (1, 8) for each equation in part a).

7. **a)** Determine an equation for the family of cubic functions with zeros –2, 2, and 5.
b) Write equations for two functions that belong to the family in part a).
c) Determine an equation for the member of the family whose graph has a y-intercept of 10.
d) Sketch a graph of the functions in parts b) and c).

8. **a)** Determine an equation for the family of quartic functions with zeros –4, –1, 0, and 3.
b) Write equations for two functions that belong to the family in part a).
c) Determine an equation for the member of the family whose graph passes through the point (2, 36).
d) Sketch a graph of the functions in parts b) and c).

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9. a) Determine an equation for the family of cubic functions with zeros $-\frac{3}{2}$, 1, and $\frac{5}{2}$.

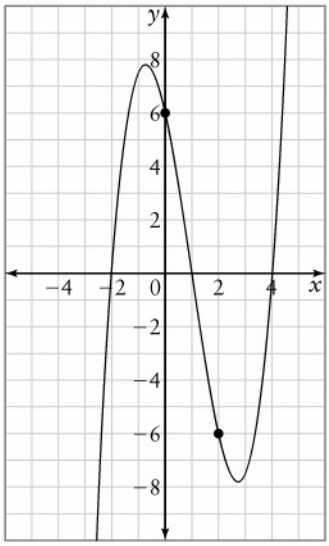
b) Determine an equation for the member of the family whose graph passes through the point (–1, –28).

c) Sketch a graph of the function in part b).

10. a) Determine an equation, in simplified form, for the family of cubic functions with zeros 2 and $4 \pm \sqrt{3}$.

b) Determine an equation for the member of the family whose graph passes through the point (1, –18).

11. Determine an equation for the cubic function represented by this graph.



12. a) Determine an equation, in simplified form, for the family of quartic functions with zeros 1 (order 2) and $-3 \pm \sqrt{5}$.

b) Determine an equation for the member of the family in part a) whose graph has a *y*-intercept of –12.

13. An open-top box is to be constructed from a square piece of cardboard that has sides measuring 30 cm each. It is constructed by cutting congruent squares from the corners and then folding up the sides.

a) Express the volume of the square-based box as a function of *x*.

b) Write an equation to represent a box with a volume that is

i) one-half the volume of the box represented by the function in part a)

ii) three times the volume of the box represented by the function in part a)

c) How are the equations in part b) related to the one in part a)?

d) Sketch graphs of the functions from parts a) and b) on the same coordinate grid.

e) Determine possible dimensions of the box that has a volume of 1728 cm^3.

14. a) Write an equation for a family of odd functions with three *x*-intercepts, two of which are $-\frac{5}{2}$ and $\frac{5}{2}$.

b) Determine an equation, in simplified form, for the member of the family in part a) that passes through the point (–3, 66).

c) Determine an equation, in simplified form, for the member of the family in part b) that is a reflection in the *x*-axis.

d) Is the function in part c) an odd function? Explain.