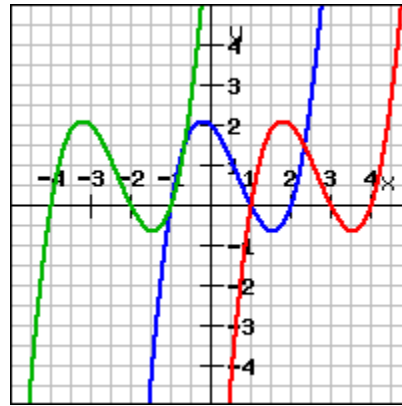
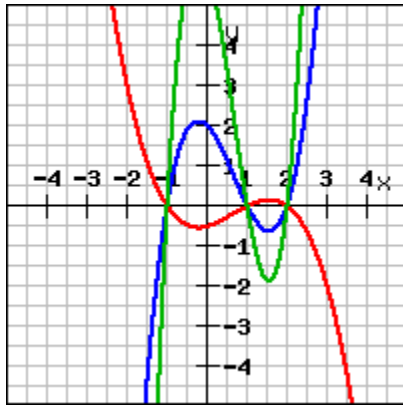


MHF4U: Families of Polynomial Functions

1. Determine whether each graph represents a family of functions, and explain why or why not.



- a.
- b.
2. Which polynomial functions belong to the same families?
- $f(x) = (x - 3)(x + 2)(x + 1)$
 - $g(x) = (x - 2)(x - 1)(x + 3)$
 - $h(x) = 4(x + 1)(x + 2)(x - 3)$
 - $j(x) = -2(x + 2)(x + 1)(x - 3)$
 - $k(x) = 3.5(1 - x)(2 - x)(x + 3)$
3. Determine an expression for the family of polynomial functions with the given degree and the given roots.
- quadratic; 2 and 7
 - cubic; -3 , 1 and $\frac{5}{2}$
 - cubic; 4 (order 2) and $\frac{3}{4}$
 - quartic; $-\frac{3}{2}$, 0 (order 2) and 5
4. For each set of roots, determine an equation for the family of polynomial functions of minimal degree, then determine the specific equation for a function that passes through the given point.
- $1, -2$ and -4 ; $(3, 140)$
 - $3, 5$ and $-\frac{1}{2}$; $(-1, 8)$
 - $-3, 4$ and 8 (order 2); $(5, -20)$
 - $\frac{2}{3}$ (order 2), -2 (order 2) and 0 ; $(1, 7)$
5. For each set of roots, determine an equation of a polynomial function of minimal degree (in standard form) that passes through the given point.
- $2, 3 + \sqrt{2}$ and $3 - \sqrt{2}$; $(1, -6)$
 - $-3, 0, 2 + \sqrt{5}$ and $2 - \sqrt{5}$; $(-2, 44)$
 - $1 + \sqrt{6}, 1 - \sqrt{6}, 4 + \sqrt{3}$ and $4 - \sqrt{3}$; $(2, -10)$

Solutions

- a. yes b. no (explanations may vary)
- $f(x)$, $h(x)$ and $j(x)$; $g(x)$ and $k(x)$
- a. $F(x) = a(x - 2)(x - 7)$ b. $G(x) = a(x + 3)(x - 1)(2x - 5)$
c. $J(x) = a(x - 4)^2(4x - 3)$ d. $K(x) = ax^2(2x + 3)(x - 5)$
- a. $F(x) = a(x - 1)(x + 2)(x + 4)$; $f(x) = 2(x - 1)(x + 2)(x + 4)$
b. $G(x) = a(x - 3)(x - 5)(2x + 1)$; $g(x) = -\frac{1}{3}(x - 3)(x - 5)(2x + 1)$
c. $J(x) = a(x + 3)(x - 4)(x - 8)^2$; $j(x) = -\frac{5}{18}(x + 3)(x - 4)(x - 8)^2$
d. $K(x) = ax(3x - 2)^2(x + 2)^2$; $k(x) = \frac{7}{9}x(3x - 2)^2(x + 2)^2$
- a. $f(x) = 3x^3 - 24x^2 + 57x - 42$
b. $g(x) = -2x^4 + 2x^3 + 26x^2 + 6x$
c. $h(x) = 2x^4 - 20x^3 + 48x^2 + 28x - 130$